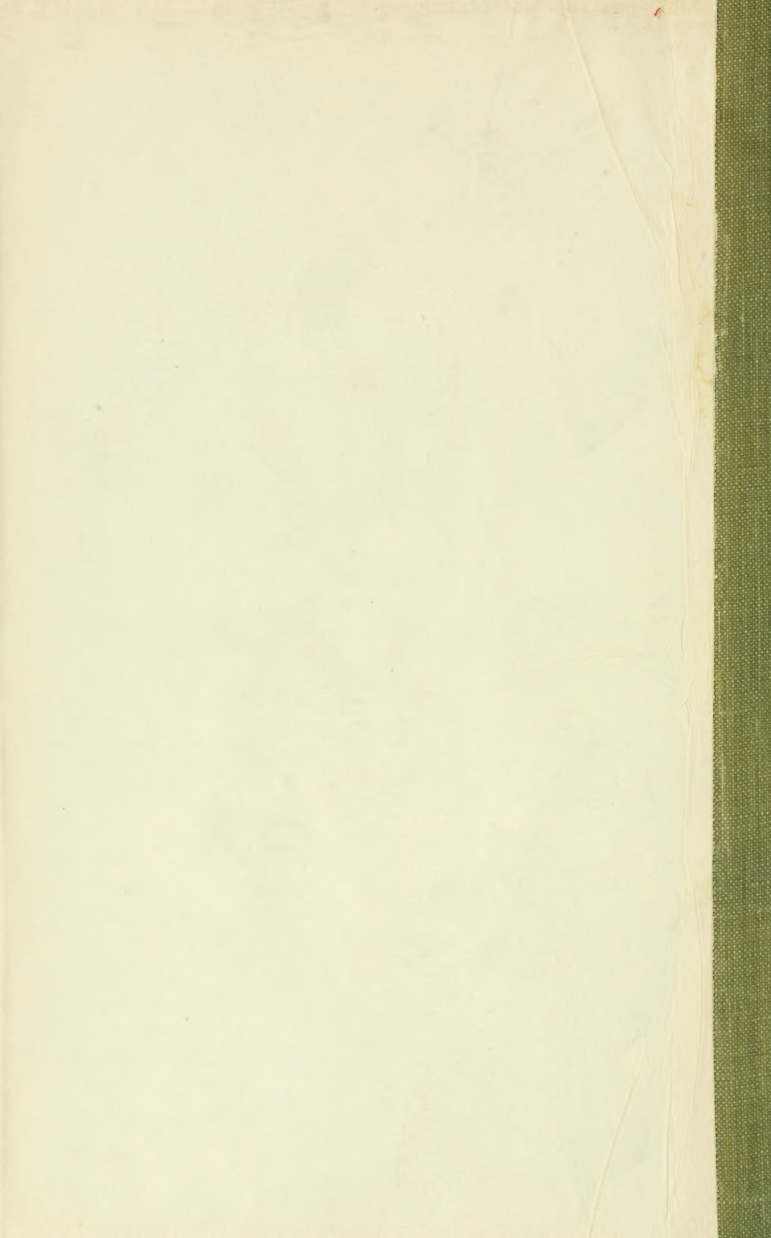


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The American Journal of School Hygiene

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Edited by Lawrence Augustus Averill

with the assistance of the following contributing editors:
Professor William H. Burnham, Clark University
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LEFTHANDEDNESS AND MIRRORED WRITING

By JAMES KERR, M. A., M. D., London

A manual operation generally involves work of both hands. An inflammatory or extra sensitive condition of even an unimportant part of the left hand will be painfully obvious in almost any action or movement of the body. As a rule the chief work is done by the right hand, with the left as auxiliary; but when necessary, as for instance in the fingering of the violin player, the left can often take up highly specialized duties. It seems evident that any manual action has to be considered in its entirety, and not as consisting of separate operations done by the two hands, but as a nervous motor complex in which both are co-ordinated.

NORMAL PHYSIOLOGY

The right hand has generally a greater capacity for fine adjustments than the left, which last is then accessory. There is at present no worthy explanation of why the right hand should be so specially used, except that it is driven directly from the left side of the brain, and that in the majority of all races that side gives evidence of a higher state of functional evolution than the other.

The interpretation of sights and sounds into ideas, and the intellectual functions which control the voluntary machinery of the organism are commonly bound up with functioning of

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a highly developed left cerebral hemisphere so that in normal individuals the left hand, although its motor centres are on the right side, is still driven indirectly through these right-sided cortical centres by the higher control of the left side.

This is well illustrated by a case recorded by Pitres as long ago as 1884. A man of 31, ten years after a specific infection, was seen with a comparatively recent post hemiplegic condition of the right side. There was some weakness of grasp and slight rigidity of the right hand, but whilst there was no other sign of nervous disturbance he could not write with that hand, although if asked to draw a man, a square, or a circle he readily did it. He could spell correctly, point out the letters required in a book, knew what was meant but could not set it down in script. He could write script with the left hand, and then copy it correctly with the right. This condition of motor agraphia with the right persisted after many months attempted reëducation, and is interesting as showing how particular intellectual centres of the left side of the brain, cut off from direct access to the centres for the right hand on that same side, worked through the left hand centres on the opposite side and then round again by way of vision and the visual cortex to the right hand centres on the left hemisphere.

Experiments on learning with mirror drawing, that is tracing over with a pencil a design, where the design and pencil point are only seen in a mirror, shows that practice with either hand gives considerable cross education or transfer to the other hand, demonstrating that the same central factors are being trained through either hand.

Whilst right handedness is the rule, men button their clothes in one direction, women in the opposite. The man architect who designs a kitchen is said to reverse many arrangements such as the draining board of the sink on the right when every woman wants it on the left; some women are miserable in a lefthanded house. It is evident that much of the division of labour between the hands is a matter of habit rather than physiological necessity.

DEXTRALITY

The specialized aptitude or capacity associated with the psychical phenomena of speech and reasoning so marked in the left brain is best described as dextrality. In a small pro-

portion of individuals the reverse happens, instead of the usual high functional development of the psychic qualities in the left brain it is the right side which shows this property; a consequence appears to be that the nearest motor centres, those of the left hand, become the most specially used and the right remains accessory.

There are animals which develop unilaterally, certain flat fish for instance, and animals with shells whorled in a certain direction in which, exceptionally, instances of reversal of growth direction occur; pure lefthandedness may be looked upon as an analogous condition. Sometimes human examples of lateral transposition of visceral arrangements are found, but of cases reported where there is any note of psychical function it is generally true that the individual was right handed.

A few exceptional records exists of "crossed aphasia," where a right handed person has had extensive damage to the left brain without any aphasic symptoms appearing, or on the other hand where in a right handed person left handed paralysis with rightsided brain disease (emboli) has occurred with aphasia. Some but not all of these people have been left handed by heredity, and apparently right by training, but there are at least half a dozen cases where this can be excluded, rare exceptions to the rule that dominant side of the brain corresponds to the opposite dominant hand. Associated frequently with this left-handedness is a reversal in the psychical sphere which may show itself in many other ways, and habits and customs of wearing clothing, tying knots, drawing diagrams, parting the hair and so forth, tend to present a negative image of that which is common. The bodily asymmetry in specialization is not only concerned with the hands, but affects hand and foot and other parts.

Madame Ioteyko, of Brussels, asserts that the left side of the body is most sensitive to pain by about ten per cent; on the other hand, Van Biervliet from many hundred of cases sums up that for appreciation of vision, hearing, touch and muscular sense, right handed are about ten per cent more sensitive on the right side; for left handed and ambidexters a similar condition holds on the other side. These two sets of observations are quite concordant with a functionally more developed left cerebral cortex being the usual condition. The left handed are also more frequently left footed in separate actions.

In the case of vision, other things such as refraction and acuity being equal, the right eye appears superior in visual memories and in fixation. This shows up in a crude way in the results of medical inspection where acuity is generally noted as best in the right eyes, the records being probably more due to mental than to ocular conditions. Dextrality then is a psychical function usually shown by the left side of the brain; in rare instances it is associated with the right side, when the individual exhibits pure left handedness, with often other reversed actions.

VARIATIONS OF DEXTRALITY

The evolution of this function of dextrality presents many functional variations. Where it attains high degree the left hand may be capable of almost as specialized refinements as the right. Famous masters of expression whether by hand or word, most great artists and many linguists, are on record who could use either hand for their work; the men who attain reputation in ophthalmic operations can generally make much greater use of the left hand than most individuals; these people are truly ambidextrous. On the other hand there are those in whom dextrality has not been fully developed, whose fingers are all thumbs, and who are often equally bad with either hand; they might by a figure be called ambisinistrals, and one does not think of them as usually fluent of speech.

From the developmental stand point there are then three classes of functional attainment in dextrality, namely:

I. The highest development of both hands in true ambidexterity.

II. The ordinary development, one hand well developed in function, the other mainly accessory.

III. Defective functioning of both hands, a poor dextrality which is more an ambisinistrality, and probably includes many of the so-called left handed.

With the small first class is associated high intellectual expressive attainments, with a low proportion showing any kind of defect.

In the enormous majority who make up the second class, right or left handedness is an accident not expected to affect mentality, and other defects will be present at the average normal rate.

Whilst in the last class are individuals whose dextrality has not properly developed and who in this sense are mentally defective, and on further examination may be expected to present not merely *gaucherie* but speech defects and the various degenerative stigmata in relatively large proportions. Dexterity and *gaucherie* thus represent extremes of a mental make up varying from the best of class I to the worst of class III. Training and practice and imitation of others will lead to further subdivisions in the observed capacity of the hands, poor dextrality may be improved and many left handed may be trained to do right handed work, and thus in a sense to appear only partially left handed. It is to be remembered that training a left handed child to write normal script is quite a different series of muscular actions, as will be seen later, from those done by the ordinary writer, so that education may have greater strain for some.

As a quality like dextrality is a function of development it is obvious that any inquiry would have to be based on individuals of like physiological development. The results for different sexes, for different age groups, or from a nursery school or an infant school would all comport to different norms.

PREVALENCE

The prevalence of left handedness of all types seems to run from two to five per cent according to methods of testing, probably four per cent is about the general average; this however may include merely awkward so-called left handed.

The most extensive and recent enquiries have been made by questionnaire in schools; this method however can never replace a careful detailed analysis of a comparatively few cases, which yet remains to be done.

In the Berlin elementary schools report for 1910-11 is a reference to the work of Dr. Schaefer who out of 17,074 children in his returns found 692 or 4.06 per cent left-handed (boys 5.15, girls 2.98 per cent) and 0.21 ambidextrous; of left-handers there were fewer in the upper than in the lower classes, and a family history of left-handedness was given in two-thirds, being 16 per cent in parents, 8.2 per cent in grand-parents, 2.5 in all three generations, and 33.5 per cent among near relatives. These findings are in agreement with Jordan's conclusions that left-handedness is of recessive char-

acter and descends from father to son. Among the 17,000 there were five cases of transposition of viscera (*situs inversus*) all right-handed.

In London elementary schools about the same time Ballard's questionnaire noted 13,189 children with 545 left-handers or just under three per cent. Among the 944 in special schools were 62 left-handed (6.5 per cent).

In St. Louis, Wallace-Wallin noted in 1915-16 of the 89,000 elementary scholars 2.8 per cent (3.6 boys, 2.1 girls) as left-handed, and a small number (128) partially left-handed.

On the other hand, a few years earlier Stier, writing on German soldiers, found 3.9 per cent out of a quarter of a million men, varying with districts and social rank from 2.3 to 6.5 per cent. The one year volunteers ("Einjährigen") of superior education and social rank showing least.

Jordan in his work on Heredity places left-handers as 2 per cent among normals, 5 to 8 per cent among lunatics, and 22 per cent in criminals.

TESTS OF DEXTRALITY

In distinguishing the dextrality of a person, attention is paid to the preferred use of the right or left hand in certain special acts, such as writing.

Prof. Max Meyer of the University of Missouri puts forward the statement that infants are at first left-handed and that dextrality develops towards the end of the first year of life. This, he states, should be expected as a consequence of the general right-handedness. His theory which seems more ingenious than probable, is that as the left side of the brain is the more specialized it is also slower in development, and meanwhile the right side is functionally simpler and earlier matured, and carries on with the result that the child is left-handed.

The infant, until the stage of evolution signified by the beginnings of speech development towards the end of its first year, grabs with both hands and shows little evidence of dextrality. During the latter part of the first year this only slowly develops, so that even the toddler has often to be corrected as to social conventions in shaking hands or using its porridge spoon, or knife and fork. Many children commence to play games left-handed, and it is getting quite fashionable

to adopt this pose. Spontaneous writing in its first beginnings will be referred to later, and the nursery school may be expected to throw a flood of light over the development of mental functions of this nature.

The general test is the use of the right hand as principal hand in special acts. Among soldiers, Stier thought the polishing of shoes or the cutting of bread the best tests and least interfered with by education. He states also that 95 per cent of the right-handed kick with the right foot, and 75 per cent left-handers with the left foot. Other smaller tricks of spinning coins, dealing cards and so on may show the tendency, not eliminated by special training.

Rosenbach's test of the eye used mainly in fixation and relative suppression of the image in the other eye is a rough experiment useful as a test of dextrality. Two objects, one near and the other distant are looked at with both eyes, say a finger held up at arm length, and adjusted so that the finger covers a chimney or spire twenty to a hundred yards away. Strictly speaking one of the objects should be seen doubled, but unless attention is specially directed to it, or the lighting very brilliant, this is not usually noticed, the second image being neglected and only the overlapping images attended to. On closing the left eye no apparent change occurs in right handed people. If now, however, the left eye is opened and the right closed, the finger appears to have jumped many degrees to the right of the chimney or spire as the case may be. The right eye having been used in fixation of both objects, the left only as accessory, causes this left to need readjustment for distant fixation and the image of the finger seems displaced relatively to the chimney. With the majority of left-handed persons the reverse is noticed, as the left eye is generally the fixing eye, and on closing the left eye the finger appears to have jumped to the left of the chimney. The test is very rough and Ballard found 43 per cent sinistrals and 45 dextrosinistrals left-eyed. Right-handers appear nearly always right-eyed, other ocular conditions being equal, and in purely amblyopic cases with squint the majority have the left as the squinting eye, fixing with the right. In connection with the Air Force, I believe, it was noticed that a quicker visual reaction time, either simple or dilemma, with the left eye generally meant a family history of some left-handedness even if the individual was not himself left-handed.

The rapidity of tapping and the strength of grip have also been relied on to show up what may be called latent dexterity in the left hand.

Wherever in absence of noticeable peripheral cause, there is found more efficient action on the left side as compared with the right, the individual may be taken as left-handed, but where there is no great difference and both sides are below the average it may be safely regarded as merely a case of poorly developed mental function of weak dextrality. The determination of dextrality may be worth enquiry as an early indication of retarded or defective mentality. The knowledge of right and left comes later. Binet and Simon use this last as a test. "Show me your left ear." At four none point to the left ear, at five half, and at six all normal children.

MIRRORED ACTIONS

In many people abnormal action in the psychical sphere results in some actions being mirrored, that is, lateral inversion of what is intended happens. Although this specular inversion is frequently associated with left-handedness quite an independent mechanism seems to cause the result.

A condition resembling this and known as *allochiria* has been seen in the sensory sphere where localized unilateral sensations, touching the skin for instance, are referred to the corresponding points on the other side of the body; these are almost always hysterical cases where there has at some time been *hemianaesthesia*.

In certain unilateral spinal lesions somewhat similar sensory signs have been seen, and an *allokinaesia* is also described where a patient told to carry out a one-sided movement does it on the opposite side, and if the eyes are shut is not aware of his error. These spinal symptoms point to the existence of double-sided routes in the cord.

In certain war wounds of the brain the patient when recovered appears quite well in every respect except that he has lost visual orientation, he recognises but cannot point correctly to an object that he sees, and cannot tell by vision the distance or size of objects. Orientation in general is therefore evidently very complicated, but it is probable that specular inversion the most easily disturbed may be comparatively simple.

The commonest example of these inverted actions is mirror writing where what is done resembles the image of ordinary script as seen in a mirror, the individual peculiarities of the hand-writing being retained. It has long been known. There is a record written in 1688, of a girl of 21, who, after a hysterical attack, is described as writing "laeve manu, ordine inverso, a dextra versus sinistram, Judacorum more" and "quae scripsisset legi non posset nisi obversa speculo." Even earlier than this however Leonardo da Vinci had done in this way writing which still exists, having suffered in his later years from a paralysed right arm. These are cases where the writing was done with the left hand. Mirror writing also occurs pathologically with the right hand, being common among hemiplegics and others with brain disease, although even here unusual with better class or well educated individuals. It is to be observed frequently in the developing child. Children becoming deaf soon after birth are said to generally mirror with the left hand, but if deafness supervenes later the mirrored writing does not occur. These observations only indicate the value of early education as a normal corrective. Practically every child produces mirrored writing at some time, generally in writing or printing its own name. Village sign boards often show that older but comparatively unpractised hands have mirrored S or N and sometimes R.

Small children in learning their letters have many tricks which are common as partial but more rare as complete mirrored work. Reversals in this way point to a lateral orientation being developed *pari passu* with dextrality, and being of like nature.

Sir William Barrett, too, notes the frequent lateral inversion of drawings in experiments on thought transference.

A journal account "that he reads every letter of the alphabet upside down and can only read from right to left is the extraordinary perversity of a five years old school boy" was an extreme case of a bright and teachable little fellow, who no doubt in a short time became quite normal. These vertical inversions show occasionally among the youngest beginners in partial forms, but in this complete form are of the greatest rarity. The young child beginning its literary efforts may reverse the letter it copies and it may do this with the hand moving either adductor or abductorwise and sometimes reverses in the fashion of the "upside down boy."

Drawings are also likely to be reversed. It is quite a revelation to show a class an inclined crescent moon figure on the blackboard for a few seconds and then ask them to draw the figure they have seen; it may be reversed or inverted or both, but is seldom correct. These children soon modify their mistakes and then, in a few, another form of reversal may take place so that whilst the eye has to be used it checks the muscular movements, and the child now only mirrors signs which it already knows intellectually and holds in memory.

One small left-handed girl in a Montessori class wrote mirrorwise on the left hand page of her copy book, but normally on the right side; she was used to script and not to capital letters. Mirrored writing set as a copy she produced exactly as she saw it on either page. She could not tell the time and by eye reproduced a diagram of the clock face with hands at three o'clock correctly on either page, but anything graphic with which she had made previous acquaintance was correct on the right but mirrored on the left page of her book. Similarly infants tested with copying English and Russian words only made mistakes with letters common to both alphabets, but copied correctly the complicated letters peculiar to Russian, whose form they had never seen before. They were like the German peasant who not knowing the Roman alphabet when tested on *PARIS* wrote *P*, *A* and *I* correctly and reversed the *R* and *S* which he knew. Apparently where the optical image has to be carefully followed the motor impulse is adjusted, but where the image has already been stored in the mind as a memory or idea and is merely liberated, mirrored reproduction easily occurs. These mental reversals are easy as one learns on working with the ground glass screen in a camera. In copper plate etching designs have to be drawn reversed and this is done by the etcher, although Meryon, the etcher of the famous "Devil of Notre-Dame," and who himself died insane, is said to have turned his back always on the view and worked from a small mirror.

In writing, the movement of the right hand is abductorwise, the little finger moving forward first. If similar abduction movements are done with the left hand, the little finger going first, then the direction from the middle line of the body is not from left to right but the opposite, right to left, and the ordinary movements are mirrored. Theories

have been based on abduction being the easier, but it is to be remembered that the oldest and oriental writings, including Jewish and Japanese, are right-hand adduction writings.

A purely left-handed child (right-brained) who started writing or lettering with the left hand, on attempting to use the right hand and using homologous muscles, doing corresponding movements adduction or abduction respectively, would do lettering mirrorwise with the right. For the same reason in an ordinary right-handed person the corresponding writing normal to the left hand will be the mirrored script of that done by the right; by experience the individual has generally learned to correct this and by a wholly different set of muscular actions produces a poor but correctly oriented imitation of the script done by the right hand. This generally, too, applies to children with the right hand crippled before school age. Where during ordinary school life this correction has not been attained, strong suspicion is raised of subnormal mentality, and in the case of children with speech defects the unusual persistence of mirrored script on attempting writing with the left hand justifies a very guarded prognosis as to speech improvement. On the other hand, after puberty, when the handwriting is formed, the more rapid and mechanical ordinary script has become, the more it is muscular and the less under ocular control; therefore, the easier and more likely is the expert young adult to write mirrorwise with the left than if writing slowly and watching carefully instead of working almost automatically. A reversed lateral orientation is not uncommon among the feeble-minded, and in many cases is accompanied by partial or developmental aphasia. In recent years examples of mirror writing have been published by more than one writer on the subject who had not examined the specimens with a mirror, or it would have been noted that the children were word-blind to the extent of gibberish aphasic writing. Specular inversion until the habit of dextrality is fully established seems comparatively easy. The failure to correct mirrored writing with the left hand after say the age of ten, has been referred to as a possible test of want of higher control; establishment of mirror writing as a habit has also been used as a psychological test for learning capacity.

SPEECH ASSOCIATIONS

The relation of speech to left-handedness is not clear. Stammering is said to be set up occasionally in left-handers by attempting to correct their left to right-handed work. One or two cases are quoted where stammering has been cured by training a child to left-hand work, although suggestion as a factor is never mentioned. The corresponding action of teaching ambidextral work has not been accused of having speech disturbance as a danger, nor has amputation or palsy of the right hand been associated with stammering as a sequel. Probably this claim of the disturbing effect on speech is due to misread statistics, or to the particular impression produced by one or two neurotic individuals.

In Ballard's observations, the questionnaire gave 1.2 per cent of right-handed with speech defects. He personally examined the 322 left-handers among 11,939 children; 51 of these were pure sinistrals with no stammerers, and 271 dextrosinistrals, who had 46 with speech defect at the time of observation, and 24 who had previously stammered. From these figures, assuming the dextrosinistrals to be left-handers who had been trained to use the right, he concluded that the training had caused such defect. Similarly in Berlin, speech defects were noticed as more prevalent among the left-handed.

Wallace-Wallin who is an iconoclastic truth seeker, only "mildly corroborates Ballard's results," although he gives the proportion of speech defects in left-handers as 4.9 per cent, nearly double that of all children. It might be noted in passing that the age distribution in the two groups, the left-handed averaging much less than that of all the children, may account for most of the difference. Further, of Wallin's cases with speech defect, 81.4 per cent began before school age and "the vast majority of our left-handed pupils who had been taught to write with the right and had not developed any speech defect."

Mrs. Scripture classifies 25 per cent of 500 cases of speech defect as either left-handed themselves or in their families. She apparently thinks, although she does not state it, that right-brainedness plays a considerable part in the etiology of speech defects. She quotes a young man of 20 affected with word-blindness and stuttering who was cured by reversing the hand, an explanation of the case one is indisposed to ac-

cept. Claiborne from experience with his own boy advocates the treatment of all stammerers and word-blind by making them use their left hand. The general conclusion may be formed that in pure left-handedness there does not appear to be any special disposition to speech defect but that in the cases of poor dextrality associated speech defect is somewhat commoner than usual, whilst the evidence of any close connection between direct production of speech defect and stress from educational training of the hand is quite trivial.

Education is subject to violent crazes which rise, flourish and vanish. Such was the ambidextral craze of a generation ago. One of its chief exponents, Liberty Tadd, gave the schools, however, the idea and practice of free arm drawing, a permanent value not yet fully appreciated, whilst his bi-manual drawings have vanished. Here the child was encouraged to do symmetrical drawings, the left hand mirroring the right. The work was quite valuable in helping the youngest children to develop semi-automatic muscular actions in contra-distinction to the continuous eye control of writing and drawing movements previously insisted upon. There was also an Ambidextral Society where others, gifted mostly with a high degree of dextrality, assumed they could develop the right side of the brain by training the left hand, a physiological misapprehension on which they played much. They were indeed setting up a second method of obtaining similar results by teaching writing, for instance, to be done by an entirely new set of muscular actions to that already developed, as unnecessary as learning to get into a house by the attic window instead of through the door, and if the stammering theory just discussed had any reality it should have produced much speech disturbance.

As a school subject, left-handed training has had wide trial, but been everywhere given up, even as punishment at Eton. Berlin experiences showed that by transfer the writing of the right hand suffered. Ambidextral culture in this sense as an educational ideal is unscientific and may be left in its limbo.

Mlle. Kipiani of Brussels proposed with a view of saving fatigue to use the old boustrophedon method, going in alternate direction like the ploughing ox, as seen in some of the oldest Greek inscriptions and as done by many children still in their spontaneous early efforts at printing. The eye in reading print would run along the top line from left to

right, then on the second line printed in reverse would run back right to left, and so on alternately. Similarly in writing, alternate lines would be mirrored. It would mean spreading the work over a double set of muscles, but still the mental effort would not be diminished.

EDUCATIONAL TREATMENT

The ease with which children learn capital letters seems related to the greater proportion of simple up and down strokes. The so-called manuscript or print writing largely avoids complicated lateral movements, and is thus easily learnt by young children, excellent results being uniformly obtained as a result of the simplification.

For the educational treatment of an apparently left-handed child a sound diagnosis is of first importance. In a case of pure left-handedness giving any other indications, left-footedness, left-eyedness, parting the hair on the right, and so on, the child is probably right-brained and the best result would be got by allowing the left-sidedness to go on. Against this is the fact that with a good brain and well developed dextrality it will be a great advantage if early habits of right-handedness are formed for the most common and essential acts. The purely left-handed should have no confusion at any time in any acts to which they have been trained, but the defectively developed and partially left-handed are quite likely to be in danger under circumstances requiring rapid action and perhaps with right-handed tools or control. It is in the case of these so-called ambidextral children, the defective and partially left-handed, that dextrality is in need of education and development; let it remain ambidextral but train the right hand as much as possible. There will be very few cases where the teacher will not be wise to do the most to develop the right. Education should bring out the individuality as far as possible, but when this means making a person a nuisance or even possible danger to his neighbors, then it is better for correction. The development of right-handed function is therefore to be advocated as educationally harmless and desirable.

PUBLICATIONS RECEIVED

EVERYDAY MOUTH HYGIENE. By Joseph Head, M. D. D. D. S., Dentist to the Jefferson Hospital, Philadelphia. Philadelphia, W. B. Saunders Company, 1920. 67 pp. Ill. Cloth, \$1.00, *net*.

The formation of pus pockets where the infection has found exceptional opportunity for growth is described fully and illustrated by drawings, diagrams and actual photographs of patients. The destructive enlargement of such a pocket is traced diagrammatically, indicating how the bone around the tip of the adjacent molar root may be completely diseased and replaced by a spongy mass of infection. Each time the tooth is used in chewing food, the infected root is jammed on the spongy infection beneath, so that the poison and germs are driven into the bone substance, whence the circulation carries them to all parts of the body to lodge and form new areas of infection. The point is made again and again that those portions of the body that have the least resistance receive the injected material, whether it be the joints, the heart, the stomach, the nerve centers, or the liver. The purpose of this attractive little volume is to inform its readers of proper and efficient methods of caring for the teeth in order that the complications which dental science today is laying at the door of the teeth may not be fostered.

FOOD FOR THE SICK AND THE WELL. By Margaret J. Thompson, R. N. Yonkers, World Book Company, 1920. 82 pp. Cloth, \$1.00, *net*.

This is a little volume of receipts arranged to comprise a well regulated diet for the sick and for convalescents as well as for the well. Receipts include breakfast cereals, breads, eggs, soups, meats, fishes, cereals, vegetables, salads, desserts, cakes, albuminous drinks, jellies, canned fruits and cheese dishes. An additional section is devoted to special medical care of the sick and convalescent, such as baths, sponges, hot-packs, salt-rubs, poultices, plasters, enemas, douches, etc.

HEALTH WORK IN THE UNIVERSITY OF NEW MEXICO. Issued by the Department of Hygiene of the University. Albuquerque, N. M. December, 1919, No 3. 14 pp.

Being an exposition of the work undertaken in 1919 by the University as the institution in New Mexico designated by the Interdepartmental Social Hygiene Board for the study and prevention of disease, especially of the social diseases. The Bulletin contains also a statement of the work done by the joint laboratory of the State Department of Health and the University of New Mexico.

A STATE PROGRAM FOR THE CARE OF THE MENTALLY DEFECTIVE. By Dr. Walter E. Fernald, Superintendent of the Massachusetts School for the Feeble-minded at Waverley, Massachusetts. Reprinted from *Mental Hygiene*, for October, 1919.

While there is no panacea for feeble-mindedness, the duty of the state is to do whatever lies in its power to check its spread. Such a program should include the following lines of work: the mental examination of backward school children; the mental clinic; the traveling clinic; the special class; directed training of individual defectives in country schools; instruction of parents of defective children; after-care of special class pupils; special training of teachers in normal schools; census and registration of the feeble-minded; extra-institutional supervision of all uncared-for defectives in the community; selection of the defectives who most need segregation for institutional care; increased institutional facilities; parole for suitable institutionally-trained adult defectives; permanent segregation for those who need segregation; mental examinations of persons accused of crime and of all inmates of penal institutions; and long-continued segregation of defective delinquents in special institutions.

MANUAL FOR CONSERVATION OF VISION CLASSES.
By Winifred Hathaway, Secretary of the National Committee for the Prevention of Blindness. Publication No. 18, November, 1919. 108 pp. Ill. 50 cents.

This is by far the finest manual available on the subject of special classes for those children who are of defective vision. It includes a historical discussion of the beginnings of this sort of educational endeavor in Cleveland, Ohio, and its subsequent expansion in other cities of this country, a description of the equipment essential for such classes, the training and qualifications of the special teacher, the nature and content of the curriculum, vocational guidance of partially blind children, etc. An especially valuable feature of the manual is the inclusion within it of a complete list of large-print books and other materials needed by such children.

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CATS AND HUMAN DIPHTHERIA*

By WILLIAM G. SAVAGE, M. D., County Medical Officer of Health
Somerset, (England)

It is rather commonly believed that cats may suffer from diphtheria, and that they may convey it to humans. It is the purpose of Dr. Savage in his contribution to the subject to (1) present a digest of the available evidence as other investigators have amassed it, (2) to present his own evidence as gathered by a considerable number of experiments, and (3) to make a critical analysis of all data available.

Under the first caption, the previous experimental work, is cited especially the work of E. Klein (1888, 89 and 90). This investigator inoculated 8 cats subcutaneously and 2 intravenously, with pure cultures of diphtheria bacilli, and made careful note of the results. Of the 10 cats inoculated, 4 remained quite unaffected, while all the others developed swellings at the site of inoculation and died within five to eleven days. Post-mortem examinations showed hæmorrhagic œdema, enlargements and congestion and fatty degeneration of various sections of the kidneys, and other complications. This experiment by Klein is much the most important of any previously recorded, but it must remain inconclusive.

What epidemiological evidence is available is largely circumstantial. Some bacteriological examinations of diseased cats asso-

*From *The Journal of Hygiene* (British), February, 1920. Vol. 18, No. 4, pp. 448-462.

ciated with diphtheritic patients have been made, but have been too incomplete in most cases to warrant dependable conclusions. It is true that many bacterial organisms, thus examined, have presented almost identical similarity of appearance and characteristics with the Klebs-Löffler bacillus, but it has rarely if ever been possible to isolate them in pure culture.

Dr. Savage's own investigations followed three lines of inquiry, as follows: (1) the bacteriological examination of the throat and nose of healthy cats not associated with any cases of human diphtheria; (2) the bacteriological and pathological examinations of cats associated with human cases; and (3) experimental investigations with kittens. As for the first of these, examinations of the throat and nose of healthy cats:—

In this experiment, 8 cats and 12 kittens were thoroughly swabbed. None of the 12 kittens showed the presence of any bacilli resembling the Klebs-Löffler, but with the 8 cats the results were less immediately convincing. 3 of them manifested no bacilli similar to the diphtheritic. Cultures made from the remaining 5, however, showed the presence of bacilli very similar to the Klebs-Löffler. Morphologically neither Dr. Savage nor the county bacteriologist who was called into consultation could distinguish it from the true diphtheria bacillus. In pure culture, however, they were able to demonstrate with certainty that, with one possible exception, none of the cats examined harbored Klebs bacilli.

In Dr. Savage's second set of experiments, only cats closely associated with human cases of diphtheria were examined.

Case 1. Severe case of diphtheria in the house. The throat of the sick child's favorite cat was thoroughly swabbed and the swabs implanted on blood serum tubes in series. The films showed numerous bacilli which morphologically could not be distinguished from the Klebs bacilli, but when isolated in pure culture they proved not to be the same.

Case 2. A similar instance of close association between a diphtheria sufferer and a cat. The latter was said to be ailing some days previous to the illness of the patient. Bacteriological examination of the cat's throat failed to reveal any definite symptoms of human diphtheria, although some bacteria very like the Klebs were undoubtedly present.

Case 3. Cat and patient closely associated, but the most careful examination revealed no diphtheritic bacilli.

Case 4. The patient was an 8-year boy who clung closely to his cat during his illness. The cat was described as "off its food"

some days before the child came down ill. Swabbing failed to reveal cultures of bacilli resembling the true Klebs bacillus. The animal was killed, but careful examination revealed no pathological lesions. Kidneys and other organs were quite healthful.

Case 5. The case of a child five years of age in an isolation hospital. The house cat was ill 3 to 4 weeks previous to the child's coming down, refusing to eat, and had discharges from nose and mouth. Kittens were born and the cat appeared quite well when the child was removed. 6 days later the animal was killed, but the post-mortem showed no membrane in the cat's throat, and no lesions anywhere in its anatomy. Cultures from swabbing were made, and bacilli morphologically similar to the Klebs bacillus were found. When, however, a guinea-pig was inoculated there was no reaction.

The third line of Dr. Savage's investigation concerned itself with experiments upon kittens. If cats carry or suffer from diphtheria it should be possible to infect them with the disease artificially, and so set up either condition. Kittens, as being more susceptible, were used for the experiment. The kittens were all kept in separate cages. Altogether 19 separate experiments were conducted, both with swabbing the throat and injecting sub-cutaneously. In each of the 19 cases Dr. Savage found it absolutely impossible to infect by the most thorough throat-swabbing. Very acute human cases were used as sources of supply of the bacilli used. Two of the strains employed were so virile that, when subsequently injected sub-cutaneously, they caused the death of the cats. Not only did the swabbing of the cats' throats not infect, but the bacilli invariably *disappeared* within 24 hours from the throats of the cats. The same was true of the nasal cavities. In feeding the cats, vast numbers of Klebs-Löffler bacilli were consumed, but without discernible results, either immediate or as revealed in post-mortem examination.

"These experiments suggest that the secretions from mucus membranes of the cat are peculiarly unfavorable to the growth of diphtheritic bacilli, and will not even permit them to remain as saphrophytes."

In analyzing the data derived from his own and other studies, Dr. Savage concludes that the evidence of the susceptibility of cats to diphtheria is extremely weak and unconvincing. It appears not unlikely that those investigators who have believed otherwise have been misled by the remarkable morphological resemblance between the pseudo-bacillus frequently present in the naso-pharynx of cats and the Klebs-Löffler bacillus. When,

however, the former is isolated in pure culture the difference is easily noted between it and the diphtheritic bacillus. Illness in cats, so frequently mentioned as a proof, is, no doubt, very often due to infectious disease from which felines are not immune, but there is no justification for dragging in the human factor to account for it. There is little if any evidence of a cause-effect relationship between human diphtheria and the feline type, or vice versa.



PROBLEMS OF PHYSICAL EDUCATION*

By DAVID SNEDDEN, Columbia University

There have been many times in world history when certain social classes and even whole nations have placed a premium on physical efficiency, but almost without exception those aspirations have sprung from the necessities of war or the chase. It has remained for our more democratic and humane age to conceive a higher interpretation of the essence of physical education. Many school systems are now promoting some form of physical education, while the states and the Federal government are beginning to manifest no little interest in the matter.

In general, the ideals of physical education as they are so frequently set forth are unassailable, but in specific aims and practices and principles those ideals are often woefully lacking. The time is now ripe for all interested persons to inquire more deeply than heretofore into a variety of questions of relative values in physical education, the climax of propaganda having now been reached. In the first place, the matter of terminology is very misleading and needs simplification. "Physical culture," while it is now dropping into disuse is almost to be preferred to the overworked "physical training." The author prefers to employ the term "physical education," which he defines as covering "all forms of assisted and controlled development, instruction, training and cure designed to conserve the physical health and growth of children towards a manhood and womanhood characterized by healthy, strong and enduring bodies, with whatever of ideals, knowledge and habits is vitally related thereto." Such broad interpretation would properly cause the following provisions for physical education to be instituted by society to the end that boys and girls may develop in accordance with the above mentioned aims: (a) safeguarding of the conditions of physical nurture, including food, rest, shelter and bodily protection; (b) opportunities for sports, athletics, swimming, scouting, and the like; (c) opportunities and incentives for simpler play; (d) for general calisthenics and gymnastics; (e) corrective gymnastics; (f) specific physical training; (g) military training; (h) instruction in hygiene; (i) hygienic and sanitary school environments; (j) medical inspection; (k) provisions for productive

*Abstracted from *School and Society*, May 8, 15 and 22, 1920.

physical work as a means to fundamental physical development.

In plant and animal life physical evolution takes place "automatically"; so we find the great number of young conscripts to have "jest growed," with little real "training." It is true, however, that the conditions of civilized human life are such as to render it increasingly difficult for the human body to reach optimum development. Mankind has created artificial conditions for himself, just as he has for highly bred cows and cabbages and apples, and it is just as essential to 'assist' nature in the former as in the latter process. Since artificial substitutes for 'natural development' are always undesirable, it follows that all physical training must be based on a clear conception of the respect in which the natural is to be aided. Any other test of a physical education precept is erroneous, and we must be warned against accepting many of the standards of physical development frequently exploited by the professional athlete and gymnast in their zeal to promote exaggerated symmetrical development.

On the corrective side, it is apparent to all of us that there is much of structural or functional irregularity to be found in children and adults. Many of these cannot be corrected. Others may be brought up to optimum standards according to their possibilities. It must not be lost sight of, however, that these standards cannot be army standards. The type of exercise recommended needs to be individual, inasmuch as few individuals in any moderate-sized group need just the sort of corrective treatment which an equal number in the same group might require. Whenever possible the type of physical training demanded of individuals should lay peculiarly serviceable foundations for the vocations which they have embraced or to which they naturally look forward. For example, "a young man from 18 to 22 remains undecided whether to become a dentist or a traveling salesman. Is it practicable during those years to give him specialized training against the strains of his vocation?" Or again, what should be the most desirable line of physical training for young girls who at from 17 and 19 years of age become in-door saleswomen?

One of the more urgent needs of a carefully thought-out program of physical education is to be met with in fostering the growth and development of girls during their pre-marriage years to the end that child-bearing may be made a less difficult and often dangerous function in the marriage years. Civilized society's addiction to sitting in chairs and riding in carriages, the reduction of manual work of the sort requiring frequent exertion

of the trunk and hips and other concomitants of civilization operate to make child-bearing often burdensome to those who are but poorly fitted by physical training to assume it. Besides, it is open to question whether programs of physical education provide for permanent recreational interests of adults. "Do educators expect women, after marriage, or on taking up salesmanship or stenography, to find tennis or basket-ball suitable forms of physical recreation? Why should not the school time of physical education be used in part to cultivate interests in walking, running, hiking, etc., with companions or without?"

The instinct of competition is one of nature's strongest whips, and it has been the experience of past decades of physical training that the success of the strong was accompanied "by the intoxicating pleasure of having beaten rivals, whilst the failures of the weak were embittered, so long as sensitiveness remained, by humiliations, often carefully staged in public view." This mistaken spirit has long since disappeared in large measure from the *mental* side of education, but it is still tolerated in *physical* education. Emulation leads to the forming of rival supporters, to search after star performers, to prolonged preliminary training, to the staging of exhibitions and to contests for prizes and public approval. Thus the true aims of physical education—to develop the individual, and *every* individual—have been pushed aside and nearly lost sight of. Covered gymnasiums, covered swimming pools, cinder tracks and the like have been another result on the equipment side which has helped to misplace the proper emphasis upon the *surroundings* and away from the *individuals* who are to be physically educated! "Surely the gymnasium is a nursery of mollicoddles! And what shall we say to the indoor swimming pool, that structure far surpassing the dreams of the luxurious Romans in its tile linings, its nickeled showers, its mechanisms for warming and pumping and purifying the water? Someone has suggested that the only next possible step would be the 'perfuming' of this dainty apparatus!"

THE RELATIONSHIP OF HEALTH TO EDUCATION*

By DR. H. G. BURNS, Supervisor of Hygiene, Pittsburgh

Of all the contributions made to the several sections of the recent Educational Congress of the Commonwealth of Pennsylvania, the paper presented by Dr. H. B. Burns of Pittsburgh to the section on health education was one of the most significant. The title of Dr. Burns' discourse appears in the *Proceedings* as *The Relationship of Health to Education*.

Children must be made to progress physically at least as uniformly as they do academically. Their increase in weight and height should be at least as constant and continuous as their progress in English and Arithmetic. Certificates of good health for the graduates of our public schools should be as much a matter of educational concern as are certificates of academic or industrial proficiency. The ten best years of child growth should never be permitted to become ten years of slow and insidious undermining of vitality. The recent experience of many countries demonstrates the fact that a soldier can be drilled, if necessity demands it, in three months, but that many times that amount of time may be required to repair the serious physical faults of the recruit.

Never before has so much of the world's future and its civilization depended upon the physical welfare of its children, and it is incumbent upon us to be just as solicitous for their bodily growth and requirements as we now are for their mental growth. It would be no less reasonable to expect minds to grow and develop to their fullest and ripest fruition without instruction and without discipline than to expect human bodies so to develop unaided, unadvised and unguarded, although in the past education has done little to foster the correct and normal evolution of the physical side of childhood. *Health*, in its broad aspect, is the possession and exercise of physical, mental and moral power. It is not merely freedom from disease any more than morality is

*From the *Proceedings* of the Educational Congress held by the Pennsylvania State Department of Public Instruction at Harrisburg last November "to consider existing fundamental American educational needs, etc." Harrisburg, J. L. Kuhn, Printer to the Commonwealth. 679 pp.

the mere absence of immoral act. Education at the cost of physical unfitness to serve and enjoy the results of service is an indictment no school system of the future can successfully defend. Education is incapable of much further advancement unless children are provided with better bodies upon which to build. A more equitable distribution of our efforts therefore between the body and the mind is the most urgent educational need of the hour. Humanity must build up its physical basis or else let up in its educational progress.

When the great war burst upon us we were a nation with a steadily shortening span of human life. That realization and the experiences of the war have demonstrated that the time has come wherein we must either be content to continue evolving a people physically less and less fit, or else we must stop and readjust the present relationship of health and education on a new basis. No man dare rest content with the first of these alternatives.

If we admit that the latter is the only rational course to pursue, we are driven incontrovertibly to the conclusion that a great deal more time must be devoted to health training of the school child than is at present given to that side of our educational system. A minimum of 25% of the total time which children pass in the schoolroom must be given over to training them in matters of sound health and sound body. The division of this time between the *theory* and *practice* of health will obviously vary somewhat with the age of the group and the material opportunities. Whether this new adjustment of the time relations can best be done by lengthening the school day or term, by reducing other subject materials or by a combination of both, is a matter yet to be determined.

Side by side with the increased amount of time made available for health training must go an increase in the item of cost. 25% of the total time in educational effort cannot be most effectively utilized with but 10% of the total appropriation. Money needs to be provided for plant, equipment, supplies, instruction, supervision and administration in health work with at least the same breadth of vision and foresight as in any other subdivision of the field.

A STUDY OF RURAL SCHOOL CONDITIONS IN OHIO*

By VERNON M. RIEGEL

Assistant Superintendent of Public Instruction for Ohio

Rural school progress has been very marked in Ohio during the past five years since the School Code of 1914 was enacted. This Code made adequate provision for the supervision and administration of rural schools by conferring upon county boards of education powers which they had not previously enjoyed.

Within the past five years much has been accomplished in the betterment of sanitary and hygienic conditions in the one-room schools.

As a result of the survey of 1913 it was found that many of these buildings were more than three-fourths of a century old and that some were of unknown age; that they lacked adequate cloak rooms and closets; that one-half were in need of repairs; that 99.6% of the toilets failed to meet the requirements of the state building code; that the janitor service was poor. Reports from forty-eight counties in 1919 show that only 143 new one-room school buildings have been erected within the past five years and that 260 have been remodeled and improved as to cloak rooms and closets. Twenty counties out of forty-eight reported that nothing had been done in the way of material repairs and 14 counties failed to report any improvement in toilets, although there are but few toilets connected with the one-room schools today that meet the requirements of the law and many do not meet the demands of society for moral cleanliness.

Observations show, furthermore, that special attention is being given to the care of the health of the children attending the one-room school in about fifty percent of the counties. In most of these, however, this has resulted through the efforts of the teachers to follow definite directions given by superintendents relative to the physical welfare of the children. An effort is being made to have the instruction in hygiene function in the daily life of the child thereby causing him to have an interest in his own

*Abstracted from a Study of Rural School Conditions in Ohio. Columbus, Ohio, Heer Printing Co., 1920. 175 pp.

physical well-being. Care of the eyes, teeth, the body in general, and the observation of correct rules governing ventilation, eating, bathing and posture, are not taught only as a means of information, but it is endeavored to secure such participation and practice as will result in habits conducive to the child's physical welfare and development. Weakness of vision, defective hearing, adenoids, enlarged tonsils, and kindred afflictions of children are reported to parents which has often resulted in the seeking of medical examination of such children, and advice as to their care and treatment.

Lighting, temperature, and ventilation are being emphasized and health and cleanliness in general are given a prominent place in the school program of many schools. Some counties are arranging for systematic health inspection and the recording of the physical condition of all the pupils, together with their mental rating and development. Eleven counties out of forty-five reporting have the services of a visiting nurse and eight reported medical inspection.



PUBLICATIONS RECEIVED

THE HEALTH OF THE TEACHER. By W. E. Chancellor, Chicago, Forbes and Company, 1919. 307 pp. \$1.25.

The purpose of this book is to guide teachers in the care of their own health while teaching, despite the necessity of accommodating themselves often to seriously unhealthy surroundings and regimen. The table of contents includes chapters on Spinal Curvature, Nervous Wreckage, Fatal Overwork, Errors of Parents in Childhood Care, Deficient Physique for Teaching, School Epidemics, Overeating, Clothing and Footwear, Relaxation and Amusement, What is Worry, Winning Old Age, etc., etc.

PHYSICAL EDUCATION, IN THE YOUNG MEN'S CHRISTIAN ASSOCIATIONS OF NORTH AMERICA. Revised edition. New York, The Association Press, 1920. 297 pp. \$1.50.

The present volume is a revision of the association textbook, "Physical Training", with corrections and additions. The chapters include the History of the Y. M. C. A., Its Field and Scope, Its Objects and Principles, General Organization of the Department, Department Program, The Physical Director, Amateur Athletics and their Administration, Training and Supervising Agencies, Physical Training in the Army and Navy, etc.

DANGER SIGNALS FOR TEACHERS. By A. E. Winship. Chicago, Forbes and Company, 1919. 204 pp. \$1.25.

A collection of 53 short chapters written in the author's well-known vein. It is intended to be rather inspirational than educational, but the epigrammatic style makes it well worth reading. The chapter headings include, among others, the following: Dig In; Don't Nag; Don't Putter; Tom, Dick and Harry; The Awkward Squad; More Boasting than Boosting; Triumphs of the Schools; The Politician in Education; Over the Top; The Foe Opportunity; Get Out of a Treadmill; Teachers Win the Battles; etc., etc.

ANALES DE INSTRUCCION PRIMARIA. Being Tomo 16, Nos. 4, 5 and 6 of the Elementary Education Department of Uruguay. Montevideo, G. V. Morino, 1919. 565 pp.

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HANDICAPPED CHILDREN

BY J. E. WALLACE WALLIN,

Director Psycho-Educational Clinic and Special Schools,

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THE SITUATION.

Democracy cannot survive unless it is made just as thoroughly efficient, nay more efficient than autoocracy! Is not this the lesson of the Great War to the democracies of the world?

Blessed with almost illimitable wealth the people of our American democracy have for many generations recklessly squandered their natural, economic and human resources.

We have wantonly denuded our forests, impoverished our soil, wasted our mineral and agricultural resources, and exploited masses of toilers while other masses of citizens, born in the lap of luxury and accorded special privileges, have been permitted to lead a parasitic existence without rendering any adequate return to society.

The folly of this waste has been demonstrated by the fact that from the dumps of "slag," "scraps" or "waste products" discarded by the industrial plants of a past generation the modern industrial conservationist, utilizing more efficient processes and using every possible by-product, has made greater fortunes than were made from the original processes. The modern efficiency engineer, armed with a chronometer and a knowledge of "time and motion studies," has proved that useless expenditure

of energy on the part of the toiler can be eliminated so that the working day can be shortened without any curtailment of output, and with positive reduction of the fatigue of the worker.

The Federal Commission on Industrial Relations estimated some time ago that we had an annual toll of 35,000 fatalities and 700,000 injuries involving disability of over four weeks, due to industrial hazards and occupational diseases, entailing an annual economic loss of nearly three-quarter billion dollars. The evidence is rapidly accumulating that a large part of this loss can be entirely prevented by the introduction of safety appliances, by the proper construction and sanitation of buildings and by the proper training of the employees, and the regulation of their working hours. The observance of "safety first" regulations in our every day modes of living has been attended by the same happy results.

During the past history of the republic workers who have been normal in body and mind have been engaged in lines of production which could have been just as efficiently carried on by persons who have been handicapped temporarily or permanently by physical or mental defects or disabilities. In consequence of this situation we have had an army of wage earners engaged in poorly paid occupations who were merely subsisting, while an army of defectives or persons with defects were living a parasitic existence in homes or institutions. Through mistaken sympathy and charity we have reduced these people to idleness and the ignominy of dependence upon others, while we should have trained them for trades which they could follow and have placed them in positions.

There are over 600,000 beds in institutions for the sick throughout the country. These institutions represent an investment of \$1,500,000,000, and the annual expenditure reaches \$250,000,000. The vast majority of these persons do not engage in any form of productive work during convalescence, although many forms of light occupation could be supplied which would be distinctly diversional and therapeutic in addition to being commercially remunerative.

On January 1, 1917, there were reported 225,824 mentally disordered persons in the public and private institutions throughout the country (Some of these were undoubtedly feeble-minded or epileptic patients without psychoses). The annual cost for the maintenance of these inmates probably amounts to \$40,000,000 under present economic conditions. It has been demonstrated again and again in the progressive insti-

tutions that a large number of these patients either already are capable or can be made capable by re-education of pursuing a variety of occupations with distinct profit to themselves from the standpoint of physical and mental hygiene, and with enormous economic advantage to the institutions and to society. And yet there are tens of thousands of potentially capable mentally disordered persons who are subsisting in a hospital ward or on a hospital lawn in complete idleness, and are actually deteriorating because of this enforced idleness.

CRIPPLED CHILDREN.

No governmental agency gathers any statistics of the cripples or of work attempted for their rehabilitation. The estimates of the number of crippled children in the United States vary from 50,000 to 250,000. On the basis of the ratio of crippled children under 15 found in Germany in 1910, we have 133,000 crippled children. The number, of course, would depend upon the definition.¹

According to the data published in 1914 by Edith Reeves, (*Care and Education of Crippled Children in the United States*), there were 37 institutions for the care of cripples in the country, 10 being hospitals, 14 convalescent hospitals or homes and 13 asylum homes. Five of the 37 were state institutions, two being in Minnesota and one each in Massachusetts, Nebraska and New York. These institutions contained 2,474 beds and during the year cared for a total of 4,901 children.² Seventeen institutions received appropriations from the state treasury, one-third of the income of the convalescent homes and one-seventh of the income of the asylum homes being derived from public funds. The average annual cost per child in 34 institutions was \$406. Schools were maintained in seven of the hospitals, all of the convalescent homes and eight of the asylum homes, the public schools supplying the teachers in 7 of these 29 institutions. There was no institution south of Baltimore or west of Lincoln, Nebraska, except one in Seattle, Washington. Public school classes were supported in New York, Chicago, Cleveland, Detroit, Philadelphia and Baltimore,³ while there were four pri-

1. The Education Committee of Birmingham has defined a cripple as a "person whose (muscular) movements are so far restricted by accident or disease as to affect his capacity for self-support."

2. To this should be added the hospital for crippled children recently established at the University of Iowa.

3. In our 1913 investigation Newark also reported an orthopedic class. A class was opened in the Minneapolis schools in 1920.

vate day classes in New York and one in Boston. Although definite statistics are not available, we have no hesitancy in saying that the majority of crippled children throughout the country are not receiving the school training which is suited to their needs and many do not receive the medical and surgical treatment which they require. With proper orthopedic and educational treatment the vast majority of these disabled children could be made positive social and economic assets, instead of being reduced to dependency or semi-dependency through neglect, as is now the case. The possibilities of the appropriate training of crippled children are indicated by the marvelous results already obtained in the rehabilitation and re-education of soldiers who have been maimed in the present war. The obligation which the state owes to restore injured soldiers to maximal efficiency, and which the state is now generously assuming as an urgent post war measure, nay as a sacred obligation, is not different from the duty which society has always owed to the child cripple, but which it has very imperfectly assumed.

BLIND CHILDREN.

There were 51,272 persons reported in the census of 1910 as "either totally or partially blind, in both eyes, so as not to be able to read even with the help of glasses," and it is estimated that this is 13,000 or 14,000 short of the true figure. 5,996 or 10.5% were under 20 years of age, but only 2,593 children were in institutions for the care of the blind. A certain number who were not in institutions were probably in public school classes. The Massachusetts Commission for the Blind recently found 3,698 blind in the state or a ratio of one blind person per thousand.

In 1915-1916 all the states in the union supported residential schools for the blind except New Hampshire, Rhode Island, Delaware, Arizona, Nevada and Wyoming. Public school classes were supported by Chicago, Detroit, Newark, New York, Cleveland, Cincinnati, Milwaukee and Racine. Of 71 schools for the blind reporting to the Bureau of Education, 58 were under the control of the state or receiving pay for state pupils, 10 were controlled by city boards of education and 3 were privately controlled. The value of the property and endowment of 48 schools reporting was \$14,659,506, the annual expenditures for 61 schools reporting was \$12,009,693, while the number of pupils enrolled in 61 schools was 5,155. It is not possible to

determine from the data at hand the proportion of the children in these schools who are totally blind and the number who are semi-blind or very-hard of seeing, nor the number of blind pupils retained in the regular schools. Nor are any statistics available on the number of blind persons at large in the community who have never attended school. In some sections of the country there are doubtless many such persons. We have heard of blind children who have been sent to county infirmaries where they have been retained for years or permanently without receiving any schooling. The fact that blind persons of suitable mental capacity who have been properly trained have become economically independent is sufficient argument for the extension of the training to all the blind who can profit from it.

HARD-OF-SEEING CHILDREN.

No extensive statistics are available of the number of children who are semi-blind, or whose vision is seriously and permanently impaired to a degree requiring instruction in a special class. Judging by the available data the number is probably larger than the number of totally blind. In recent surveys 200 such children were reported in Buffalo and 412 in Toronto, Canada. The semi-sighted at present are almost always assigned to the classes for the blind, or the classes for the mentally deficient,⁴ or backward, or (and this is more frequently the case) are left in the regular grades. Only a few cities have thus far established "hard-of-seeing" classes, or "conservation of vision" classes, viz: Boston (five classes), Charlestown, New Bedford, Springfield and Worcester, Massachusetts; New York City, Buffalo, and Rochester, New York; Ashtabula, Cincinnati, Cleveland, Lorain, Mansfield and Toledo, Ohio; Chicago, Illinois; Detroit, and Grand Rapids, Michigan; and Minneapolis and St. Paul, Minnesota. Ohio has 17 of these classes and Massachusetts 10. Complete justice can be done these children only in classes in which the methods and appliances are adapted to the incurably visually handicapped who are not blind.⁵ The results in Ohio indicate that where school inspection includes the examination of the eyes by a skilled ophthalmologist there is one sight-saving pupil to every 1600 of the school population, that many of the children entering the conservation-of-vision classes have been excluded from all educational advantages be-

4. We have taken occasion to refer to this fact in "Problems of Subnormality," 1917, pp. 51-85.

5. Winifred Hathaway, see *Manual for Conservation of Vision Classes*, 1919.

cause of their inability to use the ordinary equipment, and that about 33% have been returned to the regular grades when appropriate instruction has been provided in "hard-of-seeing" classes.

DEAF CHILDREN.

In 1910 the Federal Census reported 44,708 persons who were "*both* deaf and dumb." "Persons who are deaf but not dumb, or persons who are dumb but not deaf, are not to be reported." It is admitted that the returns were not very accurately made. A special investigation of 19,154 "deaf and dumb," of those totally deaf who lost their hearing before the eighth year of life and of the "partially deaf" whose hearing became affected before the eighth year, indicated that 7,125 were less than twenty years of age, that 7,541 were reported as congenital cases, while 9,253 became affected during the first four years of life.

In 1915-1916, all the states in the union supported residential schools for the deaf except Delaware, Nevada, New Hampshire and Wyoming. Public day classes were maintained in fifteen states. Of 159 schools reporting to the Bureau of Education, 69 were state-controlled or received pupils at public expense, 71 were public day schools supported by city boards, while 19 were private. The value of the property and endowment of 66 state schools amounted to \$21,041,425, and the annual expenditures in 65 state schools \$3,850,476. There were 11,784 pupils in the 69 state schools; 2,362 in public day schools, and 587 in private schools, or a total of 14,733. From the available data it is, again, impossible to determine what percentage of the pupils in these schools and classes were totally deaf, what percentage hard-of-hearing and what percentage speech defectives with unimpaired hearing, nor can we determine the number of deaf pupils who have been retained in the regular classes or assigned to special classes for speech defectives, for mental defectives or for the backward, or the number of deaf persons who have never received any schooling. But it is probable that the number of deaf children who are not now given appropriate training reaches into the thousands and that because of this neglect, they will become dependents. Thousands of deaf children of suitable mentality have been made economically independent by proper instruction. The enormous amount of public money expended for their education has proved ultimately to be an economic gain to the state.

HARD-OF-HEARING CHILDREN.

There are no statistics available on the number of children whose hearing is so impaired (but who are not deaf) that they should be given the advantages of special methods in hard-of-hearing classes,⁶ nor have we any data on such classes apart from classes for the deaf, for oral instruction or for speech correction. It is, again, probable that there are decidedly more children of this type—possibly from 5 to 10 times more—than deaf children. They can be best trained in special classes, but these classes should be distinct from the classes for the deaf.

SPEECH DEFECTIVES.

If the ratio of speech defectives found in our survey in the St. Louis schools (Report of the Board of Education for 1915-1916, pp. 174-211) holds throughout the country, we have over 352,000 lispers and over 157,000 stutterers (including the so-called stammerers) in our public and private schools of elementary and secondary grade. There are no statistics available from which even an approximate estimate can be made of the number of speech defectives who are receiving the educational and medical treatment which their conditions require. But it is safe to say that the vast majority are left to "outgrow their handicaps," or at best they receive only the speech training which the regular teacher can give. The efficiency of many of these children will be permanently marred because of our neglect. There are many positions which are not open to persons who stutter or articulate very indistinctly no matter how capable they may be otherwise. Stuttering is a cause of rejection for service in the army. The large majority of public school systems have not thus far established departments of speech correction,⁷ although

6. The enormous variations in the public school statistics of children with defective hearing are largely due to differences in the standards. We are here referring only to children whose hearing is so defective that they should be in a special class. The degree of defect needed to make the child eligible for admission remains to be formulated.

7. No agency, not even the Bureau of Education, gathers annual statistics of the work done in the interest of speech defectives throughout the country. The writer included speech correction work in a questionnaire addressed in 1913 to public schools in all cities with a population of 4,000 or over. Only 302 schools of 1,350 addressed replied, and of these only 18 reported classes for speech defects: "The Mental Health of the School Child," 1917 (reprint), 383-429. The number has probably been increased three or four-fold since this investigation was made. The increase has been particularly marked during the last few years. For an earlier investigation see Van Sickle, Witmer and Ayres, *Provisions for Exceptional Children in Public Schools*, 1911, p. 69 f. (Government Printing Office).

the proper training of speech defectives is just as much a public function as the proper training of the mentally defective or the blind or the deaf.

SUBNORMAL CHILDREN.

1. FEEBLE-MINDED CHILDREN.

In spite of the numerous surveys made during the last decade, no statistics are available of even approximate accuracy as to the number of feeble-minded children and adults throughout the country. Moreover, were it possible to gather complete statistics, it is perfectly evident that the number returned would depend entirely upon one's concept of feeble-mindedness. If we included all those backward three or four years, and all those with an intelligence quotient less than .75 or .70 by the Binet-Simon scale, (particularly the Stanford version), using age 16 as the limen of mental maturity, the number would probably reach the absurd figure of 40 or 50 millions. We have for years repeatedly opposed the employment of arbitrary, artificial and extreme intellectual standards of feeble-mindedness. If we adopt the more reasonable socio-legal standard of Great Britain, according to which (1913 law), the highest grade of the feeble-minded are "persons in whose case there exists from birth or from an early age mental defectiveness not amounting to imbecility, yet so pronounced that they require care, supervision, and control for their own protection or for the protection of others,"⁸ the ratio of feeble-minded in the general population would probably be about 1 in 500. Assuming a population of 100,000,000, this would yield 200,000 feeble-minded in the

8. Tredgold's formula will be preferred by some. He limits the highest grade of the feeble-minded to "those persons who are so lacking in general mental capacity, in common sense, that they are incapable of subsisting by their own unaided efforts." The mental defective is "incapable at maturity of so adapting himself to his environment or to the requirements of the community as to maintain existence independent of external support." The legal definition in the Illinois Act of July 1, 1915, is as follows: "The words 'feeble-minded' in this Act shall be construed to mean any person afflicted with mental defectiveness from birth or from an early age, so pronounced that he is incapable of managing himself and his affairs, or of being taught to do so, and requires supervision, control, and care for his own welfare, or for the welfare of others, or for the welfare of the community, who is not classifiable as an 'insane person'." It is evident that we can define feeble-mindedness psychologically according to any self-determined, arbitrary standard. But the value of such a conception is largely academic. We must never lose sight of the fact that the fundamental criterion of "feeble-mindedness" is social: it represents a condition of social (socio-industrial) inefficiency which is due to deficiency of intelligence dating from birth or from early life, and which is so profound as to render the individual "incapable at maturity to maintain existence independent of external support." When the social inefficiency is not due to this cause it is advisable to classify the case otherwise—psychopathic, sociopathic, constitutionally inferior, constitutionally immoral, borderline with emotional and volitional defects, etc.

United States. Many years of experience in examining children in the St. Louis Public Schools leads us to believe that the percentage of feeble-minded children (using the term as above defined) in the elementary schools of this system is about one-half of one per cent, and this estimate agrees with Dr. Walter Cornell's estimate for the Philadelphia Schools and Dr. Clara Schmitt's estimate for the Chicago schools. If this ratio held throughout the country there would be over 102,000 feeble-minded children in the public and private elementary schools of the country—certainly a number so vast, in view of what is now being accomplished in the appropriate training of the feeble-minded, that nothing will be gained by the insistence, in spite of the lack of satisfactory proof, that 400,000 represents a "very conservative" estimate of the number of feeble-minded in our elementary schools.

In 1916, 38 state schools and 28 private schools for the feeble-minded reported to the Bureau of Education, while 118 cities reported "public day schools and classes for backward and subnormal children." The annual expenditures for 35 state schools reporting was \$6,702,147 and for 13 private schools \$252,462.

The number of inmates in public and private residential schools for the feeble-minded was reported to the Bureau of Education in 1915-1916 as 32,882, of whom 21,106 were in school. In the public day classes 16,524 pupils were reported, making a total of 37,630. The inference, from these figures indicate that over 62,000 feeble-minded pupils were not receiving proper instruction in special classes does not necessarily follow, for, on the one hand, some of the children in the residential schools and special classes were not feeble-minded—a large percentage of the pupils in some special classes we have inspected have been backward, borderline, speech defective, word-blind (most cases of dyslexia), hard-of-hearing and hard-of-seeing rather than feeble-minded—while, on the other hand, feeble-minded children hard to recognize may have been receiving individual instruction in ungraded classes which were not included in the reports.⁹ To illustrate, in the last available Report of the Commissioner of Education, the number of pupils in the St. Louis 'Schools for Individual Instruction' is given

9. The Bureau of Education has not sharply discriminated between special classes for mental defectives and ungraded classes for borderline, backward, and restoration cases. In attempting to gather statistics, on special and ungraded classes, as used above, we have previously pointed out the equivocal character of the reports: *The Mental Health of the School Child*, 333f.

as 383, but no mention is made of the pupils in the ungraded classes for the borderline, backward and restoration cases. The number of pupils in these classes in 1918-1919 was very much larger, namely 3265, as compared with 455 in the special schools for mental defectives. Some of those on the borderline in these classes will eventually prove to be feeble-minded, and will then be transferred to the special schools. But there is little doubt that the majority of the feeble-minded school children throughout the country are in the regular grades, receiving insufficient attention or instruction poorly adapted to their needs, at great eventual economic loss to the state. Fifteen states and the District of Columbia have not yet established residential institutions for the training or custody of the feeble-minded (A list of these states is given in *Problems of Subnormality*, 1917, p. 31. However, some of these negligent states are now building institutions). Illinois has enacted a clear-cut mandatory commitment law applicable to a feeble-minded person (as defined on p. 9 of ns.) when through "want of proper supervision, control, care and support, it is unsafe and dangerous to the welfare of the community for him to be at large without supervision, control, and care" (A somewhat similar law which we proposed through the Children's Code Commission for Missouri in 1915 failed of enactment. Minnesota has since enacted a mandatory commitment law, and possibly other states.)

2. BORDERLINE AND BACKWARD CHILDREN.

Our experience in the St. Louis public schools indicates that for every feeble-minded child there are from five to ten children on the borderline of mental deficiency and distinctly dull and backward who require individual and differentiated instruction in ungraded classes and elementary industrial schools. The assumption is probably conservative that at least 3% of elementary pupils throughout the country classify in this group, giving an estimate of over 615,000 pupils (aside from the feeble-minded mentioned above) who are too backward to do successful work in the regular grades.¹⁰ There is a larger group of children, probably from 10% to 20% of the elementary school enrollment, who are more or less pedagogically retarded in one

10. In this group we have found children with specific defects, such as visual aphasia, dyslexia, auditory aphasia, poor vision, poor hearing, speech defects, etc. Most of the children with specific defects whom we have examined have also been more or less backward intellectually. Many of the children in this group cannot be restored to grade or brought to full normality.

or more branches for one reason or another. These pupils are not in urgent need of special attention in ungraded classes, although they would greatly profit from such help.

UNRULY AND DELINQUENT CHILDREN.

It would, of course, be impossible to estimate how many "unruly," "ungovernable," "disciplinary," "incorrigible," "refractory," "morally unstable," "morally defective," or "delinquent" children there are, because the statistics, even if collected, would depend upon the definition, and no sufficiently precise definition can be formulated to secure uniform or accurate returns. Many children are "troublesome" or "disciplinary" intermittently, temporarily, or merely when confronted by certain conditions. However, the number of children in state reformatories or "state industrial schools" is annually reported to the Bureau of Education. In 1916, 121 state, city, county, and private schools receiving public appropriations, reported an enrollment of 61,828: 49,009 boys, and 12,819 girls. The average enrollment for the year in 114 schools was 35,603. 24,617 were committed during the year, of whom 2,856 were reported from 79 schools as unable to read and write. The value of the property of 114 schools reporting was \$46,226,458, and the expenditure for 1916 for 109 schools reporting was \$9,585,047. No annual register is kept by any governmental bureau of the number of ungovernable or truant children in disciplinary classes or parental or home schools connected with public school systems.¹¹ But in the aggregate, only a small percentage of troublesome children found in the schools throughout the country have been assigned to such schools or classes or have been given the special consideration which their condition requires. In some school systems children who are hard to manage are assigned to the classes for mental defectives, on the supposition that they are mentally defective or on the supposition that the training given mental defectives is the best training for "delinquents." Where careful physical and mental examinations have been made, it has been found that a considerable percentage of delinquent children are mentally and physically normal, a large percentage suffer from various phys-

11. Information concerning such classes has, however, been gathered: "Provision for Exceptional Children in Public Schools," Bulletin No. 461, Bureau of Education, 1911, p. 32. "The Mental Health of the School Child," Yale University Press, 1914, 383f. The most exhaustive and discriminating study of delinquent children is William Healy's "The Individual Delinquent," 1915.

ical defects (and some from patent nervous or psychopathic disorders), a large percentage are backward, and a certain proportion are feeble-minded. The majority of disciplinary children whom we have examined during the last decade have been subnormal, most of these, however, being backward rather than feeble-minded, while a certain proportion of them have been psychoneurotic, psychopathic or constitutionally inferior, or epileptic (reference is made to these types in the following section). A large number of the backward children whom we have examined have been more or less morally obtuse. At the same time, a large number of our delinquent children, defectives no less than normals, would not have become delinquent had they had better home care and had they grown up in more favorable environments. The necessity for making a mental and physical examination of delinquent or morally unstable children, and an investigation of environmental influences, as the first step in the program of care and treatment, has received wide recognition during the last decade, and yet it is probably true that adequate examinations are not made in the case of the large majority of the children before action is taken with respect to their disposition.

If it is true, as alleged, that most adult offenders can be recognized during childhood and youth—they are recruited from the unstable, defective, unruly, or truant pupils—we cannot spend too much effort and expense in the careful investigation of the internal and external factors which contribute toward the development of juvenile delinquency and crime, and of the measures which are effective in combating criminal tendencies, for the problem of crime must be attacked more and more from the point of view of prevention rather than from the point of view of retribution, reformation, or rehabilitation. The fact that the cost of the police department in most large cities, exclusive of the cost of courts, the loss or diminution of productive wages of the imprisoned, etc., is only exceeded by the cost of the educational department, indicates the concern, even from the economic point of view, with which the problem of crime must be viewed.

EPILEPTIC, PSYCHONEUROTIC, AND PSYCHOPATHIC CHILDREN.

No data are available on the prevalence of these types. The concepts of 'psychoneurotic' and 'psychopathic' children still

vary among different authorities. Epileptics are usually sent to institutions for the feeble-minded or insane—only nine states maintain separate institutions for their care and training—while psychopathic children in some states are sometimes admitted into observation wards connected with hospitals for the alienated. A large number of the epileptic and the vast majority of the psychopathic are at large in society and receive no special study or care. New York City has made an initial attempt to establish public day classes for psychopathic children, while two or three city schools have had classes for epileptics, but these classes have been difficult to maintain because of the precarious attendance. In some cities the epileptics are admitted to the classes for the mentally deficient. But children who are subject to seizures cannot avail themselves regularly of the advantages of instruction in public day classes. When they cannot be trusted upon the streets they must be kept at home, unless omnibuses are provided. Such children require the advantages of a residential school. Although the prognosis as to cure is not favorable, in the light of present medical knowledge, epileptics of fair mentality can, under proper care and treatment, be made partially or wholly self-supporting, particularly in supervised industrial and agricultural pursuits. Many epileptics are psychotic or are so unreliable morally that they require constant supervision and restraint.

We know too little as yet about the psychopathic child, but we nourish the hope that through prolonged scientific investigation we shall eventually be able to prevent or minimize the development of psychopathic, aberrant tendencies and abnormal behavior in children, and the frequent sequelæ of instabilities, crimes and psychoses in adults. In this field of human wastage and tragedy, more can be said concerning what we have left undone and what we do not know than concerning what we can now scientifically define and what we have so far accomplished.¹² The recent interest in "mental hygiene" augurs well for the future, and certainly the enormous amount of nervous and mental wreckage and disorder produced by the shell shocks and horrors of the war will arouse the nation to the necessity of continuously safeguarding and conserving the mental and moral health of the nation. This work must be begun with the children in the schools.

12. For a single text, treating briefly and discriminatingly of epilepsy, psychopathic disorders and moral delinquencies, we would refer to E. Tanzi's "A Text Book of Mental Diseases," 1911.

THE REMEDY.

Enough has been said to indicate the extent of our National leakage through inadequate care and education of handicapped children, and the need of developing a consistent and efficient nation-wide policy of "conservation" and "thrift" in this particular domain of social endeavor. The economic and social burden entailed by our neglect has cost the nation far more monetary loss than the support of adequate systems of examination and corrective training would have cost. Within the last two decades the demand for the conservation of our natural resources and for the organization of our economic, industrial, educational and civic activities more fully in accord with principles of scientific efficiency, has indeed directed attention to the necessity for the elimination, diminution or proper utilization of our human waste products. But the World War, with its stupendous sacrifice of human and material wealth—humanity's best blood—with its staggering cost which must be liquidated during the century upon which we have entered, and with the new ideals of Democracy born in its throes, will emphasize as nothing else could the necessity for the scientific husbanding of our material resources and the conservation and utilization of all our man power. In no field will the demands of the new Democracy be more keenly felt than in the field of education, for the very perpetuity of Democracy depends upon a responsive, educated, efficient citizenry.

In order to efficiently train the future citizens of the republic we must recognize two principles as fundamental: first, that every child who is capable of being trained, whether defective or normal, must be required to attend school during a given period of time; and, second, that we must provide the types of instruction and training which will maximally meet the peculiar conditions presented by each child.

COMPULSORY SCHOOL ATTENDANCE LAWS.

In 1916 all the states of the union had enacted compulsory school attendance laws, except Mississippi, but the laws are far from satisfactory, as evidenced by the following facts. While the average number of days in the school term was only 160.3, the average time attended by each child from age 5 to 18 was only 91.7 days. The percentage of attendance was thus only 57.2. Thirty states required attendance during the whole school

year (Louisiana, however, only when the school year amounted to 140 days or less); one state during 150 days; 6 states only from 100 to 120 days and 11 states only 80 days or less (3 of these only 60 days). The limiting age for the application of the law is 12 in three states (the limit may be raised in the cities in these states), 13 in one, 14 in eighteen, 15 in ten, 16 in fifteen and 18 in one. In Arkansas the law does not apply to eighteen counties.

In many states liberal exemptions are permitted. The attendance cannot be enforced when the children are "physically and mentally incapacitated," when there is "no school within a reasonable distance," when their "labor is needed for the support of the family," when the parents are "unable to provide clothing," etc. Frequently the law is nullified through non-enforcement, owing to the indifference of the local communities.

Adequately to meet the school attendance situation in the light of the needs of a socially efficient citizenship, the minimum length of the school year in every state in the union should be increased to nine months, the minimum time that the child must attend school should be eight years, compulsory attendance should be enforced universally for the whole school year, and the law should be applied to all educable types of children including the blind, deaf (eighteen states now apply the law to the blind and the deaf), crippled, feeble-minded and destitute. Exemption should apply only during periods of illness when attendance would be impossible or inimical to the child's health. Parents must be required by law to provide schooling either in a public or private school or institution, or in the home. The state should provide the necessities in the case of the indigent. Eight states do this now. The more handicapped a child is, the more essential it is that his efficiency be increased to the highest point possible, not only so that he shall be able to support himself, to the extent that this can be made possible, but so that he shall be made contented and happy through the ministrations of profitable and wholesome employment.

DIFFERENTIATED TRAINING.

1. THE MENTAL AND PHYSICAL EXAMINATION OF SCHOOL CHILDREN.

A democracy should demand and vouchsafe equality of educational opportunity for "all the children of all the people." But this does not imply that all children must be subjected to a

uniform course of instruction. On the contrary, it means that we must supply differentiated instruction to meet the needs of the different levels of physical and mental capacity and the different specialized mental and physical abilities and disabilities which we find among the millions of differing children in the schools. In order that this work may be efficiently done—that is, in order to avoid over-differentiation, under-differentiation and wrong-differentiation—the schools must be organized more or less on the plan of the modern hospital. That is, the pupils should first be carefully examined and diagnosed before any attempt is made to differentiate the instruction. Doubtless the skilled teacher and school administrator can sometimes arrange special courses for the differing pupils with a fair measure of success after they have had ample opportunity to observe the children and test their learning ability. But the work will be more efficiently done if the child is first given a careful physical and mental examination, in order that his physical and mental condition may be better known, and in order that remediable defects may be discovered and corrected when possible.

Every new school entrant should be given a thorough physical examination. The examination should be repeated, if possible, annually. If this is impracticable, the child should be examined as and when symptoms indicate the need. It would also be well if every new entrant could be psychologically examined. But if this were impracticable, we should at least strive to psychologically examine all the children who present special educational problems before we attempt to differentiate their school work.

In order to carry out this program of work the schools must have available a co-operating staff of physicians, dentists and clinical psychologists. It would be well for the school system itself to maintain clinics for the eyes, ears, nose, throat, lungs, teeth, and nervous system, and a psycho-educational clinic, all manned by specialists. At the present time, the majority of school systems throughout the country, however, are without departments of medical, dental, and psychological inspection.¹³

13. For data on school medical and dental inspection, see Luther Halsey Gulick and Leonard P. Ayres' "Medical Inspection of Schools," 1908. For data on school psychological inspection, see J. E. Wallace Wallin's "The Mental Health of the School Child," Chapters II and XVIII. Medical and psychological inspection have spread considerably since the above books were written. For the latest measuring scales of Intelligence, see Lewis M. Terman's "The Measurement of Intelligence," 1916, and Yerkes, Bridges and Hardwick's "A Point Scale for Measuring Mental Ability," 1915; and for scales of psycho-motor development, see Pintner and Patterson's "A Scale of Performance Tests," 1917, and Wallin, Psychomotor norms for Practical Diagnosis, 1916.

One of the immediate after-the-war aims should be the extension of the systems of physical and psychological examinations to all school systems. This may necessitate the employment of county and state examiners, to serve rural schools and schools in villages and towns, which cannot supply their own examiners. There should be in every state a Bureau of Child Hygiene, in charge of a physician who is an expert on matters relating to individual and community hygiene and sanitation so far as they relate to the growth and health of children, and a Bureau for Mental Defectives in charge of an educationalist who is a specialist on mentally defective and retarded children, on psychological and educational tests and in clinical psychology.

Where the above suggestions cannot be carried out, the schools should employ a physician on part-time. Where hospitals and medical school dispensaries are available medical specialists generously offer their services to school children. Such service should be sought more frequently than is now the case by the schools, even when they maintain departments of hygiene, provided the latter do not have specialists on their staffs. In localities where the services of physicians or clinics cannot be secured, the teachers should be trained to make certain preliminary inspections for physical defects, and should be required by law so to do. This would include the rough tests of visual and auditory acuity, and the examination of the teeth and the spine for obvious defects.

Physical and psychological examinations without proper physical and educational treatment are of no particular service to the child concerned. The physical defects of many children fail to be corrected because of the indifference, neglect, poverty or hostility of the parents. Moreover, some children are not transferred to the special classes in which they can be given the advantages which their condition requires, for the reason that the parents object to their removal from the normal children, frequently on very trivial grounds. This situation should be met by the enactment of legislation which will enforce treatment, if necessary at the expense of the community, when treatment is clearly indicated and the parents refuse to heed the recommendations—the law should be invoked only as a measure of last resort—and by the adoption of a firmer policy on the part of school executives with reference to the transfer of pupils recommended for different kinds of special classes. Such transfers should be uniformly enforced unless there are very good

reasons to the contrary. The mere sentimental objections of parents should not be permitted to stand in the way of the child's best educational interests.

The view is gradually gaining acceptance that it is preferable to educate defective children in day classes rather than in residential institutions. The chief argument is that institutional life tends to "institutionalize" the children instead of preparing them for efficient participation in the activities of society outside of the institutions. Children are best prepared *for* society by being trained *in* society. Economically it seems advantageous to train in the public schools even those educable feeble-minded children who should later be placed under permanent custody in state colonies because of lack of proper home supervision and control. Nevertheless there will always be need for residential institutions, because there are not enough defective types in many communities to make it possible to establish special classes.

Where the number of pupils with a given defect in any school district is sufficiently large (say from 10 to 15), the establishment of special classes should be made compulsory by state law. When the number is not sufficiently large the law should provide for the transfer of the pupil at the expense of the district to an adjoining school district having accommodations in the proper type of class. When proper instruction cannot be afforded in day classes or at home the pupils should be placed in the proper state institution.

The state should grant a special subvention for the maintenance of special day classes under conditions which insure efficient instruction. It is of prime importance to secure properly qualified teachers in all kinds of special classes. Before teachers are appointed, they should have been given special training bearing on the types of handicapped pupils which they expect to train. In addition to the work of instruction the teachers might well do some of the social work connected with their particular problems. For this extra preparation and service they should receive increased emolument.

The compulsory reporting of defective children, particularly the deaf, blind, crippled, and suspected feeble-minded, to the state department of education or some other state department would be a great aid in securing for these pupils the attention they require.

The educational work in all types of state institutions should

be under the supervision of the state department of education. The supervision now usually extends only to the institutions for the blind and the deaf.

RECOMMENDATIONS REGARDING SPECIAL TYPES OF CHILDREN.

Owing to the demands of brevity, we can offer only a few recommendations regarding some types of defectives.

THE CRIPPLED.

Public day classes should be established for children who are disabled but not diseased. Operative cases should be sent to hospitals and children with bone tuberculosis should be transferred to convalescent homes in the country. Pupils who are unable to get to the day school should be brought thither in omnibuses, at the expense of the community or of philanthropic organizations which are willing to render this service. The school rooms, preferably on the ground floor, should be supplied with special or adjustable chairs, appliances for orthopedic gymnastics and equipment for appropriate literary, industrial and vocational training.

THE BLIND AND VISUALLY HANDICAPPED.

The application of a 1% or 2% solution of silver nitrate to the eyes of the infant immediately after birth should be made mandatory by law.¹⁴ The adoption of this harmless expedient will result in the prevention of an enormous amount of blindness. Since 1880, when the etiology and prophylaxis of ophthalmia neonatorum were discovered, there has been a slight decrease in the proportion of blind under the age of 5, the percentage for each decade from 1860 being as follows:

1860	1870	1880	1890	1900	1910
2.5%	1.6	1.9	1.5	1.0	1.0

The reduction of 8% in the prevalence of ophthalmia neonatorum during the last decade among children entering schools

14. See the North Carolina Act of 1917, in the "Third Annual Report of the National Committee for the Prevention of Blindness," for 1917. 20% of the pupils in the state school for the blind in that state in 1915-1916 were reported as ophthalmia neonatorum cases.

for the blind is largely ascribed to the timely use of gonorrheal antiseptic. The reduction will doubtless be much greater if the use of the antiseptic is made universal.

Public school provisions must include not only classes for the blind but also "conservation of vision" classes for children with extreme uncorrectable myopia, congenital cataracts, nystagmus and corneal opacities. In the latter classes large use should be made of the oral method of presentation, of books printed in large type, and of individual blackboards which may be placed at the proper distance from the child. The child should be trained for a vocation in which his visual defect will not be a serious handicap.

THE DEAF AND THE HARD-OF-HEARING.

In addition to the classes for the totally deaf, the public schools should establish separate "conservation of hearing" classes for the very hard-of-hearing, in which the aim should be, through the use of the oral method, to conserve and develop the limited amount of hearing which remains, and to develop the child's speech. Through lip reading the eye can be trained to supplement the ear. At the same time, large use should be made of the visual method of appeal in these classes. The children should be prepared for vocations in which the hearing defect will least handicap them. Children who are clearly feeble-minded should not be accepted in the conservation of hearing or conservation of vision classes.

A large amount of the deafness due to remediable causes (venereal infection, inflammation of the middle ear through infection from the throat, etc.), should have been prevented. It is inhuman, and should be regarded as criminal, to permit a child to become deaf when the remedy is near at hand. Children with otitis media should be obliged to undergo treatment. Teachers should watch for running ears and symptoms of deafness, and report suspected pupils to the inspector of hygiene or urge upon parents the necessity of having the child treated before permanent damage has been done to the essential mechanism of hearing. Neglect has deprived many children of a whole world of sensations and burdened them with a permanent handicap.

SPEECH DEFECTIVES.

All the teachers in the kindergarten and the first two grades should be given special training in phonics, and in the correct

articulation and pronunciation of English words, not only in order that they may lay a correct foundation for the oral work in English for all the children, but in order that the large number of children annually entering the schools who present simple or uncomplicated types of speech handicap may receive proper speech attention at the very beginning of their school career. The number of speech defectives entering the schools is so great that it is not probable that a sufficiently large staff of special speech teachers can be secured in most schools to reach them all. Moreover, properly trained the kindergarten and primary teachers would be able to successfully treat most of the cases of baby talk, lisping, indistinct enunciation, careless, slovenly pronunciation and mispronunciation. Most of these impediments are not due to organic defects, but to the acquisition of bad habits of speech either accidentally or through the imitation of faulty models. The more complicated cases of cluttering, lolling, lisping, stuttering, nasality, etc., require the services of the well trained speech teacher, while some speech disorders yield only to psychological analysis and medical and surgical treatment. Ideally the first step in the treatment of all complicated or serious forms of speech disorder should be a mental and physical examination. Many speech disorders are associated with mental deficiency or mental disturbances, while others are associated with organic defects or functional nervous disturbances. The physical treatment, when indicated, should precede the educational and psychological. Speech defect in the incurable hard-of-hearing responds best to the oral method used in training the deaf to speak. The employment of visiting speech teachers is probably more economical than the establishment of special speech centers, although it is advisable to congregate the more serious types (particularly stutterers) in special speech classes. Moreover, it is often necessary to establish proper condition and secure proper co-operation from the home if permanent improvement is to be secured.¹⁵

SUBNORMALS.

All grades of the feeble-minded except idiots and low grade imbeciles (all of whom attain a mental development of less than 5 years) are proper subjects for public school education. They are most successfully trained in centers apart from the ele-

15. On the treatment of speech defects, consult E. W. Scripture's *Stuttering and Lisping*, 1912, and C. S. Bluemel's *Stammering and Cognate Defects of Speech*, 1913 (Both of these books contain references to other treatises).

mentary schools and apart from other types of special classes, such as the classes for 'incurable,' truants or backward pupils. No child should be assigned to a class for the feeble-minded unless he has been properly certified as a result of a careful investigation of his history and present mental and physical condition. It is most important that the child be given a careful psychological examination. The majority of candidates should be tried out in the kindergarten and first grade before they are reported, while children who cannot be definitely certified as a result of the examination to be mentally defective, should be given the benefit of the doubt and be assigned to ungraded classes for further trial under most favorable conditions. The general administration of the special classes should be lodged in the director of the Psycho-Educational Clinic, who should be a well-trained psycho-educationalist who has specialized on defective children and psychological and educational diagnosis. The staff of the clinic should be made so large that it can serve as the clearing house for all types of mentally, morally and educationally deviating children.

The curriculum for mental defectives should include the rudiments of the literary branches, which should be presented concretely and in correlation with practical industrial problems; sensori-motor exercises; industrial training; physical training; moral training, mostly habituation in correct modes of response; speech improvement and correction; and musical training. The guiding aim of the program of studies in the special school for mental defectives should be distinctly practical rather than cultural.

The problem of retarded pupils cannot be successfully handled in the elementary schools unless a system of ungraded classes is organized, (in addition to the special schools) for the borderline, all-around backward and retarded-restoration types, who are far more numerous than the feeble-minded. It is advisable to locate these classes in the elementary school buildings or grounds,¹⁶ so that the pupils may take advantage of the

16. Details for the organization of ungraded classes may be found in "Problems of Subnormality," 1917, pp. 278-331.

The following are among the most important books dealing with feeble-minded and backward children of interest to educators, social workers, and psychologists:

Anderson, Meta L.

Education of Defectives in the Public Schools, 1917.

Barr, Martin W.

"Mental Defectives, Their Treatment and Education," 1910.

Binet, Alfred, and Simon, Th.

"Mentally Defective Children," 1914.

"The Boston Way," compiled by the Special Class Teachers of Boston, 1917.

general social activities of the school. At the same time, it would be advisable to have two or three classes in an ungraded center, in order to insure better grading of pupils. The restoration cases should be given intensive coaching in the literary branches, with a view to return to the regular grades as soon as possible, while the borderline and backward children should be given a considerable amount of literary work, presented concretely and objectively, during their younger years. As it becomes evident with the lapse of years that these pupils possess little ability to deal with literary and abstract subject matter, the amount of time devoted to handwork should be increased. The literary work should be presented in correlation with the handwork. The children who eventually prove to be feeble-minded should be transferred to the special schools, where a greater amount of time should be devoted to appropriate forms of manumetal training than is advisable to give to this work in the ungraded classes, while the borderline and backward pupils should be transferred to elementary industrial schools at the age of from 12 to 14, depending upon the upper limit of the compulsory attendance law. It should be evident from the above plan that the ungraded classes will serve as a clearing house in conjunction with the clinic for children of doubtful diagnosis.

There is plenty of work to be done in the world calling for the services of borderline and very backward or dull people. We must have our "hewers of wood and drawers of water." But there is little, if any, need in modern civilization for the feeble-minded, as above defined. We must forsooth train all the feeble-minded who come into existence who are improvable, but it would be more important to prevent the birth or development of any more in the future. It has been said that if all the feeble-minded now in existence could be colonized or sterilized, the feeble-minded progeny would disappear in one or two

Bridie, Marion F.

Special School Work, 1917.

Bronner, Augusta F.

"The Psychology of Special Abilities and Disabilities," 1917.

Doll, Edgar. Clinical Studies in Feeble-Mindedness, 1917.

Groszmann, M. P. E.

"The Exceptional Child," 1917.

Holmes, Arthur. "Backward Children," 1915.

Holmes, Wm. H. "School Organization and the Individual Child," 1912.

Miner, J. B. Deficiency and Delinquency, 1918.

Mitchell, David. "Schools and Classes for Exceptional Children," Cleveland Foundation, 1916.

Shuttleworth, G. E., and Potts, W. A. "Mentally Deficient Children," 1916.

Tredgold, A. F.

"Mental Deficiency," 1914.

Witmer, Lightner (and others). "The Special Class for Backward Children," 1911.

Wrightson, Hilda A. "Games and Exercises for Mental Defectives," 1916.

generations. Unfortunately there is no evidence to justify such an optimistic outlook. There are many "carriers" of feeble-mindedness, themselves not feeble-minded, who probably could never be recognized as carriers. For years we have gathered heredity data on thousands of feeble-minded and backward children whom we have examined individually. We are forced to admit that we have not found such grave cacogenic conditions as have been reported from some institutions. Of thousands of parents (mostly mothers, however) of my clinic cases whom I have had occasion to interview only a very few, possibly only a score, could have, or should have been certified for commitment to an institution for the feeble-minded. Possibly the record would have been worse had I conferred with all the parents, both mothers and fathers. Those who did not come may have been of the lower order of mentality. And yet, my conclusions are in accord with those of Walter E. Fernald, a careful student of long experience with the feeble-minded under institutional care: "The average family chart of the patients admitted to the Massachusetts School for the Feeble-Minded is not a 'black' chart. . . The average defective coming to the institution is not the child of a feeble-minded parent or parents. Indeed, comparatively few of the parents observed would ever have been considered as candidates for segregation, even in the cases where the feeble-mindedness was undoubtedly of hereditary origin." (Ungraded, 1918, 172f.) Doubtless we shall be able to reduce the number of the feeble-minded by colonization, by sterilization, and also by the prevention of ante-natal and natal trauma, early infections, injuries and parental inebriety, and by the employment of anti-luetic¹⁷ and organotherapeutic treatment¹⁸ in indicated cases; but we shall probably always have feeble-minded people for whom society must make provision. The proposal to eliminate these people by euthanasia need not be very seriously considered in the

17. Persons suffering from active venereal diseases should be quarantined until the danger of infection is over.

18. Much emphasis has recently been placed on the relation of perverted functioning in the endocrin system to mental deficiency. Of scores of children under prolonged glandular treatment under the supervision of neurologists, whom we have examined during the last few years, only a few have shown any considerable mental improvement, exclusive of cretin or cretinoid cases due to hypothyroidism. Pupils reported as restored through the administration of pineal or pituitary extracts or adrenalin we have been obliged to retain in our special schools as mental defectives. Reports which are based only on favorable cases may have made us over sanguine. We need statistics on a large number of cases which have been followed up for years, before we can speak definitely regarding the types of glandular cases which will improve to any considerable extent from the administration of glandular extract. The value of thyroid extract in infantile myxœdema has been demonstrated. It is held that there are eight or more types of infantilism, but in many of these the mental defect does not amount to feeble-mindedness.

present stage of opinion on that question. We will do well to assume a conservative attitude toward the whole problem of feeble-mindedness until science has justified a more optimistic outlook.

Doubtless some of the recommendations which we have made with respect to the different types of defectives discussed above will seem to some quite utopian, even within the limits of our practical suggestions.

Let us add, finally, that the entire program outlined in this essay for the efficient care and training of mentally and physically handicapped children, will be partly frustrated unless the private and parochial schools are also required to inspect their pupils physically and mentally and to provide differentiated training to meet the defects found in the pupils. There is no good reason why private schools should be granted a charter for doing the State's work, unless they discharge their trust as efficiently as the State-supported schools.

Editor's note: The foregoing article by Dr. Wallin was originally requested by us as a chapter for a projected book: Problems of Educational Reconstruction. Unfortunately, however, our plans for the volume have recently fallen through, and Dr. Wallin has very graciously permitted us to publish the material in the JOURNAL. To any of our readers who may desire additional copies of the article, we shall be pleased to furnish them at twenty-five cents per copy.

PUBLICATIONS RECEIVED

FORSYTH DENTAL INFIRMARY FOR CHILDREN.

Fifth annual report. Boston, January, 1920. 43 pp. Ill.

Contents include a general statement in regard to the Infirmary and its purposes, personnel of the committee and staff, the director's report to the trustees, departmental reports and statements, etc.

FRANCIS W. PARKER SCHOOL STUDIES IN EDUCATION.

Published by the Faculty of the School. Vol. 6, 1920. Chicago, The Francis W. Parker School, 1920. 45 cents. 161 pp.

The theme of this latest volume of the Studies concerns itself with the individual and the curriculum and experiments in adaptation. The subjects discussed at some length include: the individual project method; social interests in the classroom; thrift as an element in good citizenship; the function of art in the course of study; etc.

CHILD HEALTH PROGRAMS FOR PARENT-TEACHER ASSOCIATIONS AND WOMEN'S CLUBS.

Issued by the Bureau of Education, Washington. *Health Education* No. 5. 1920. 16 pp.

The material has been prepared to answer a country-wide demand. Parent-teacher associations and women's clubs have felt the need of definite study along the lines of child health, in order to guide adequately the health program of their own schools.

A local group can undertake the study of all or part of this wide field of work, giving one meeting to each topic. It is suggested, however, that all groups give an initial meeting to the consideration of "Teaching health in our schools," as the other special topics of the program are considered from this particular viewpoint. The meetings should take the form of conferences rather than lectures, the leaders preparing themselves by means of the special bibliography outlined.

A special topic is devoted to methods of publicity and organization that have been found effective in awakening the interest of communities and public officials.

The lessons include "Teaching Health in Our Schools," "School Lunches," "Nutritional Classes," "Correction of Physical Defects," "Recreation," "Our Teachers' Health," "School Sanitation," and "Good Housekeeping in the Schools."

THE ENGINES OF THE HUMAN BODY. By Arthur Keith, M. D., L. L. D., F. R. S. Conservator of Museum and Hunterian Professor, Royal College of Surgeons of England, etc., etc. Philadelphia, Lippincott, 1920. 284 pp. Plates.

Being the substance of Christmas Lectures given at the Royal Institution of Great Britain, 1916-17. On such an occasion as the Christmas lectures at the Institution the technical terms used in a medical college are out of place; a fresh machinery for the display of old facts must be devised. For this reason the author went to the workshop of the engineer and selected examples of his inventive ability to illustrate the creative genius of Nature as manifest in the human body. Inasmuch as the lectures were addressed to a "juvenile auditory" they must perforce be rendered not only simple in language but interesting to boys and girls as young as ten and twelve years of age. The muscles are the motor engines of the human body and they follow the principle of internal combustion in a special way which man has not yet been able either to improve or to approximate. The bones are living levers of which the foot and the fore-arm are interesting types. Cartilages and oil-glands comprise a most efficient lubricating system. The heart is a double-pump whose "head of pressure" is maintained in the arteries. The lungs are a pair of living bellows, working now slowly, now very rapidly. The workshops and laboratories of the human body, where food is turned into fuel for the tissues, are composed of an alimentary tract which is likened to the alimentary system of a motor-cycle. So with the other important physiological processes of the body.

The author, it appears to us, has succeeded so well in his professed endeavor to make the principles of human anatomy and physiology intelligible to young students as to have actually made them *interesting*—which is perhaps as high a tribute as could be paid to any writer on physiology. It is not difficult to imagine the bright eyes and interested faces of boys and girls which were upturned to Dr. Keith as he unfolded lecture by lecture the wonderful mechanism of the human body, which was after all only a *living* engine.

THE CHILD'S DAY. By Woods Hutchinson, M. D. (Revised Edition) Boston, Houghton Mifflin Company, 1920. 186 pp. Ill. \$0.76.

A sketch of the usual course and activities of a child's day, with a running commentary of explanation, and such outlines of our bodily structure and needs as are required to make clear why such and such a course is advisable and such another inadvisable. The sections include *Waking up, Breakfast, Going to School, In School, "Absent to-day," Work and Play, The Evening Meal, A Pleasant Evening, Good Night*, etc. The book is interestingly written in language comprehensible to boys and girls in the intermediate grades, and should prove a valuable addition to the growing number of hygiene readers adaptable to the growing child.

A HANDBOOK OF HEALTH. By Woods Hutchinson. (Revised Edition) Boston, Houghton Mifflin Company, 1920. 341 pp. Ill. \$1.12.

Presents in language within the comprehension of the boy and girl the best information and advice of the medical profession for a proper understanding of the body and the best way to run it efficiently. Two-thirds or more of the text is devoted to hygiene and sanitation, with a minimum treatment of anatomy and physiology. The subject of food as fundamental health is discussed with exceptional fulness. *A Handbook of Health* is designed for the use of children in Grades VII and VIII.

COMMUNITY HYGIENE. By Woods Hutchinson. (Revised Edition) Boston, Houghton Mifflin Company, 1920. 314 pp. Ill. \$0.96.

With the awakening of the social consciousness, we are beginning to realize that the concern for health involves more than the individual. It is a community problem, and the earlier children are led to cooperate with one another, with parent and teacher, and with the community at large, for the promotion of public health, the better it will be for all. *Community Hygiene* is a series of plain, common-sense talks to children on how the home, the school, and the community cooperate to make them strong, healthy, useful citizens. The book is prepared especially for children in grades V and VI.

A new and very practical feature of the revised editions of each of the three books in this series is the addition at the end of four pages of "setting up" exercises (fifteen exercises in each case) drawn from the *Official Handbook of the Boy Scouts of America*. Each book is further provided with a set of suggestive questions for the teacher. Taken together, the three books offer an elastic course in physiology and hygiene for children in Grades III-VIII.

GYMNASTIC DANCING. By S. C. Staley and D. M. Lowery. Adopted by the Y. M. C. A. Physical Directors' Society. New York, The Association Press, 1920. 212 pp. Ill.

The term "gymnastic dance" has come to have certain definite implications which make it the direct opposite of the "esthetic dance"; the latter implies grace, complexity, and femininity; the former implies vigor, simplicity, and masculinity. The present volume was prepared primarily for men and boys, gymnastic dancing being such a large factor in the majority of physical training programs of the present day, a need exists for a work on this general subject. An effort was made in producing the book to hold to fundamentals: "practicability" has been given precedence over everything. The writers believe that their offering will be of service in three respective fields: (1) to standardize the nomenclature of gymnastic dancing; (2) to serve as a textbook in schools of physical education; and (3) to serve as a source book for the formation of gymnastic dances.

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SOME HYGIENE PROJECTS FOR THE UPPER GRADES

By LAWRENCE AUGUSTUS AVERILL

Editor of *The American Journal of School Hygiene*

If there is one subject of study in the school curriculum that above all others offers opportunity for project work, it is the subject of hygiene and sanitation. If there is one subject of study in the curriculum that is most unfruitful of results when handled in the orthodox textbook-lecture method, it is the subject of hygiene. If there is one subject of study which should exert a large influence over the future lives of individuals, that subject is hygiene. If there is one subject of study that has failed notably in its manifest purpose, that subject is hygiene.

All this by way of introduction to the point of this paper, which is that the subject of hygiene can be made just as fascinating and just as permanently of value as any other of the common branches ordinarily pursued by boys and girls of school age. In fact, because of the immediate and profound relationship between personal and community hygiene, on the one hand, and the life and happiness of human beings on the other, it is doubtful if any other subject in the whole curriculum is fraught with such possibilities of compelling interest and purpose for boys and girls, provided only that the proper methods of handling the matter be followed by the teacher. In this paper we shall be concerned especially with such methods as

are particularly applicable to the upper grades, *i. e.*, the seventh and above, although they should prove just as workable with children in the intermediate grades.

In the first place a word should be said concerning the organization of the class for hygiene work. By all means, do away with the old-fashioned "recitation" idea. Let the room be democratized as far as it is feasible during the hygiene period if at no other time. Lead each child to feel that he is a part of a small community which is met together to discuss matters pertaining to the welfare not only of the miniature school society but also of the wider community beyond the school premises. One of the greatest evils in our present day education lies in the strange paradox that school precepts too often do not leave the school grounds when the children do. Instruction is a sort of fickle dog that comes leaping to meet the owner when he enters the school premises, plays and capers around him interestingly during the day, but which, when the session closes, slinks into the shadows of the yard the while the master passes out the gate into the outer world, not loth to be rid of his pestiferous companion. There is not that mutual and constant relationship between the two existences of the child which should naturally be the case. Everyone knows that there is a schoolroom language and an outside language, for example; a schoolroom attitude and an outside attitude; a schoolroom civics and an outside civics; even a schoolroom spirit, voice, mood, initiative (or rather lack of it), courtesy, industry, posture, etc., and an outside spirit, voice, mood, initiative, courtesy, industry, posture, etc. And most of all there is—or certainly has been in the near past—a schoolroom hygiene and an outside hygiene: a schoolroom conception of health and an outside practice of it and interest in it. Children have been encouraged to talk glibly of physiological processes and hygienic or sanitary principles, but all too rarely indeed, in the experience of the writer, has such glibness become an incentive for modifying or enriching or supplementing the way of living of most individuals who have sat their allotted span of years under the perennial exhortations of lecturer-teachers or drunk enfeebling and de-energizing draughts from poured-in textbooks.

And so, I say, beware of the old-fashioned methods of teaching hygiene. They may do very well for teaching Greek, or archæology, or perhaps even agriculture in a girls' seminary, but for virile training of boys and girls in practical and usable health habits and attitudes—never. Such training must be emi-

nently a *participative* process, a *cooperative* process, a *one-hundred-percent-enrollment* process. And how shall we organize the hygiene class in order to give a chance to this participative process? In a certain school which the writer knows the children have been organized into what is called a "Keep-Fit Club." Such other suggested names as "Good Health Club," "Health League," "Sound Body Club," etc., were forthwith dismissed from consideration by the children as not being so challenging, so *pioneering* as "Keep-Fit Club." Possibly the soldier *motif* was at the basis of this feeling on the children's part.

The club elects one of its numbers president, another vice-president, and a third secretary. In addition to these officials, there is also a committee on meetings to which the teacher, *ex-officio*, belongs, and which with her determines upon interesting projects to be performed by the club. No one—not even the teacher—would think of referring to the weekly club meeting as a *class*, much less a *recitation*. It is rather a *Club* meeting. The president presides, save when the vice-president is able by sound logic to wrest temporarily the chairmanship of the meeting from the hands of the chief executive. Nominally, he is to direct the club in its discussion of the project which chances to be up for consideration. Actually, however, the children need little guidance. Occasionally, it is true, they stray away somewhat from the set topic, but they usually find themselves shortly, and as time goes on they diverge less and less from the aim which they have set up for themselves for the meeting. Interest at the meetings of course runs high. Personal experience is more and more often summoned up as the year progresses, and gradually some of the children even become so bold as to venture to propose and defend opinions of their own which may be quite at variance with those of others—surely an innovation in most throne-rooms. The offices of president and vice-president rotate around the class in the course of the year, so that the best principles of democracy are always in evidence even in the political complexion of the club. The teacher moves dimly across the background of the club setting, but her presence and part are decidedly inconspicuous. Textbooks and hygiene readers are always available and often furnish the entire groundwork for a meeting. Pictures and posters and varieties of other illustrative materials are always to be had in abundance. Initiative, self-control, self-reliance, independence and suspension of judgment, argumentative resourcefulness and other attitudes and attributes of mind are developed, as

well as courtesy, broad-mindedness and—above all, perhaps—an intelligent and apparently permanent interest in the general subject of hygiene and health.

Following are some suggested projects in hygiene and sanitation which have and should—attacked in a socialized way—prove interesting and valuable to all upper grade classes. They do not by any means exhaust the list of possibilities, but merely enumerate several lines of investigation that are exceptionally valuable and essentially practicable in the carrying out.

1. **Grading of public markets.** For this project it will only be necessary for the club to determine arbitrarily upon some scheme of grading, and then to assign as many as possible of the local markets to the various teams for studying and ranking upon the basis agreed upon. A scale of 100 is always an excellent working basis, inasmuch as the children are quite familiar with it in connection with their own individual school ranks. 90 or better might be determined upon as representing highest quality of sanitation in each classification; between 75 and 90 might represent varying degrees of fair quality; between 50 and 75 might indicate poor quality; while a score lower than 50 might be understood as representing an unsatisfactory condition of sanitation. The several classifications upon which the markets are to be ranked should include the following: (1) general cleanliness; (2) protection of foods on display; (3) neatness and cleanliness of clerks; (4) condition of screening and absence of flies; (5) care in the handling of unprotected foods; (6) freshness of perishable stuffs; (7) ventilation; (8) refrigeration.

With a team of two or more boys and girls responsible for investigating, scoring and reporting back to the club upon the sanitary appointments and conditions of a specific market, very valuable and significant results should be obtained. Interest in the topic and the desire to make no errors will inspire the children, before finally checking up their results, to make frequent visits to their stores, develop in them keenness in observation, niceness of judgment, and broaden their conceptions of what society has a right to expect and demand of dealers in foods designed for human consumption.

2. **Learning about the local board of health.** The carrying out of this project, too, may be delegated to several teams. One will find out the names of the persons on the board; how, when, and for how long they are appointed or elected; what their salaries are; and whether or not they are physicians or laymen.

Another will concern itself with the financial phase, finding out from available reports how much it costs the city annually to maintain its board of health; what portion of the income from taxation is thus used up, etc., etc. There will be abundant opportunity here for correlation with arithmetic. Still another team will investigate the various duties and activities which the community has a right to expect of its health officials, and in how far the present board is meeting these expectations. It will be a revelation to most of the children to discover that the work of the health department is classifiable into a considerable number of divisions or bureaus, each one of which nominally at least exercises some measure of control over the general health, comfort and happiness of the community. In addition to all of these lines of attack, a group might very profitably make a survey of the leading health welfare agencies of the community, apart from the established board of health, and report in club meeting upon the activities of these private or philanthropic organizations. In this way the children will come to appreciate something of the value and field for individual participation in looking after the health of the group. Public boards of health are indispensable, they should come to feel, but after they have fulfilled all their proper functions there yet remain ample opportunities and necessity for charitable enterprise on the part of public-spirited citizens and societies.

3. **Finding out about local disease incidence.** Most local boards of health issue monthly statistics covering the incidence and extent of communicable and other disease during the preceding thirty days. Only relatively few citizens are aware of the type and prevalence of disease, or of the fact that exact information on the subject is available periodically from the health department. It has been the experience of most civics and hygiene teachers that older children take an absorbing and healthfully impersonal interest in the death rate and disease incidence of their own community. For a child to be taught that the mortality rate for tuberculosis, or for pneumonia, or for typhoid fever for the registration area of the United States is such and such a percent is likely to have little if any lasting impression. But for the same child to keep watch of the rates for his own city, whether for the purpose of comparing them with those of some other locality or mere informational purposes concerning home, the result is quite different. The hygiene club may well consider this absorbing topic, perhaps keeping pin-mats on the walls during the winter months, show-

ing at a glance not only the predominating diseases of the season, but their distribution over the city as well. One group of children may work upon the problem of how to read local mortality statistics, and whether the same method of tabulation and reduction is exemplified in the state and national statistics. Another group may plot and explain curves of prominent diseases in the community. Still another group may interview the health authorities and inform the club how the department manages the mechanical side of keeping its fingers tolerably accurately and constantly upon the health pulse of the community. Finally, an enterprising team may secure all possible information as to the organization and functions of the state board of health in so far as they relate to the tabulation and publication of disease statistics. In this way the children may get some practical notion of the niceness of articulation of local with state and even with national departments.

After the first reaction of stupefaction on the part of the health officers of the city to find the growing citizens manifesting an interested concern in their work has passed, they will not only be willing but glad to render to their youthful interlocutors an account of their stewardship of the city's choicest treasure-in-store: its health. It may also result in setting them to thinking as they have never thought before upon their responsibilities and opportunities. No doubt they will be glad to furnish a speaker from their department on request who might bring to the boys and girls of the club a most interesting as well as compelling message.

4. **Investigating the city water supply.** Excellent opportunity for a field trip will be offered in the prosecution of this project. This may either be made on a holiday, or Saturday, or perhaps after school. At all events unless the reservoirs are too inaccessible every effort should be made to have the club actually visit and study them. Ordinarily the city water department will be able to supply the services of someone of its force as guide and "lecturer" for the short time which the club and teacher can devote to the actual inspection of the preserve. In the event that the system is situated too far away, or a field trip to its vicinity is otherwise infeasible, at least the lecturer should be invited to tell the club something about what a city water department means in size, extent, cost of upkeep, planning for future expansion, purification, filtration, etc., etc.

But before the club is ready for this information, it will need to investigate a little for itself. One team will find it an inter-

esting project to learn the exact source or sources whence the city reservoirs derive their supply. Home geography may be correlated here very nicely. Another team will study the purification and filtration processes; another the pressure and pumping systems; another the nature and location of the mains beneath the city streets; another the house-pipes, meters, shut-offs, etc. Pictures of the old Roman aqueducts—obtainable in the Perry pictures and elsewhere—will serve to add interest to the whole fascinating story of man's perennial and often herculean efforts to force pure water across great distances from an abundant source of supply to his own common habitation.

5. Learning about the milk supply. This is always an interesting topic to investigate. One team will set itself the task of determining roughly how much milk is required daily to meet the demands of local consumption. A second team will study the chief sources of supply of this food, together with the main routes of its importation into the city. A fourth will make a survey of the number of local distributors; the length of their routes; glaring cases of distributive duplication—such for example as when four different milk teams were noted by one child to be delivering milk daily in a single short street on which there were six houses. A fifth will inquire into the precautions required to be taken by dealers and distributors and producers in order that the purity and cleanliness of the milk supply may be safeguarded. A sixth will report upon the values and cheapness of milk as a food. Still other teams may study such related topics as Pasteurization, distribution centres, care of containers, cost of producing milk, cost of transportation, etc., etc. Ample opportunity all along the line is offered for correlation with arithmetic.

6. Studying local methods of garbage and sewage disposal. So far as the writer's experience goes, whatever attention so-called "hygiene" classes of the past have given to the disposal of wastes has been almost purely academic. No bigger problem, however, confronts most municipalities than the satisfactory disposal of their garbage and sewage. Study of the whole problem should occupy a recognized place in all school-rooms where older children are taught. One team may report upon articles of food that are frequently wasted by careless housewives. Another team may compute the actual volume of garbage which the city has to remove weekly. Another team may study the workings of the reduction plant, provided the municipality maintains one, or of whatever method is employed

for the final disposition of garbage. If a piggery is maintained another team may keep track of the profit and loss side of this phase of municipal operation.

On the side of sewage, one group will study ordinary house plumbing, traps, drains, etc.; another the work of the purification plant; another the construction of sewers under the city; another the local methods of sewage reduction and final disposal; another, the financial aspect for the city. Pictures and drawings of the old Roman sewers; the reading of Victor Hugo's fascinating description of the gigantic sewers of Paris in *Les Misérables*; a field trip to the local works; and the projection upon the screen of slides obtainable from most municipal engineering departments will add much interest to the project.

7. Finding out how diseases are spread. This constitutes a much more valuable field of study on the part of boys and girls than does a mastery of the intricacies of the body circulations, glandular secretions, nervous pathways, etc., etc. One team may experiment elementarily with yeast as a typical bacterium; another may investigate the fascinating story of the conquest of yellow fever, thus studying a common protozoan disease; another may tabulate graphically the number of people who die locally from preventable communicable disease; another may report upon certain sanitary principles and precautions to be observed in the care of the sick; another may learn about toxins and antitoxins, etc. Any number of specific contagious diseases, such as the ordinary so-called children's diseases, may be studied by different groups. One group may work out a set of "health rules" to be presented to the club for discussion and possible adoption as club mottoes, slogans, etc. Other related topics under this caption should include: care of wounds; open windows; ventilation of schools, theatres, public buildings, etc.; individual and common drinking cups; spitting in public places or in public conveyances; vaccination; outdoor sports and exercise, etc., etc. The spreading of disease is a topic broad enough to include practically everything in any way related to the activities and deliberations of any "Keep-Fit Club."

8. Finding out about the fly nuisance. The most favorable time of year for entering upon this project will be obviously in the spring, just at the beginning of the fly season. One team will find out how flies are able to carry about with them the germs of disease. (There are now available excellent slides

covering this whole topic.) A team will report upon the life history of the fly. The entire club membership will divide itself into teams for the purpose of investigating all possible breeding places for flies in their several neighborhoods. Subsequently some or all of them will learn about the methods of treatment of breeding sources in order to render them safe, and will actually so treat them, reporting upon their results in club meeting. Fly-traps may be constructed in manual training class and attached by the children to their own garbage pails at home. Local newspapers may be requested to give some interesting publicity to the work which the club is doing in the extermination of the common house fly. It will prove an interesting related project in arithmetic to calculate the expense which the people of the community are obliged to bear annually in the screening of their doors and windows against the fly intruder, to say nothing of the remarkable variety and array of fly-papers and poisons that clutter their homes and stores! The state boards of health will be glad to supply without charge abundant literature dealing with the whole matter of the fly nuisance. "Fly weeks" may be entered into, in conjunction with "Keep-Fit Clubs" of other schools, and the attention and interest of the entire community may be enlisted toward the possible abatement of the fly nuisance from the neighborhood.

A similar project aimed against the mosquito may be worked out by the club, and prosecuted with similar good results.

Conclusion. The foregoing projects represent only a few of a very large number of interesting and important problems—all related to the health and happiness and comfort of the community—which any enterprising school system may substitute for the old-fashioned "physiology" that used to be (and still is?) administered in generous doses to passive boys and girls. All that is needed on the part of the teacher is the conviction that these perpetual doses never have attained permanent fruit in resulting positive health attitudes in the children dosed. Wrong motives, wrong notions of educational values, and confused and mistaken educational aims have cooperated to maintain this negatively threadbare pedagogy. The writer recommends that, in place of the older practice in this regard, a practical and significant series of projects in community or personal hygiene and sanitation be inaugurated in our upper elementary and high school grades. The possible number of such projects is limited only by the ability of the teacher to conceive them and opportunity and time on the part of the children to

carry them out. For the rural school too, obviously, the same possibility exists of building a course of study in hygiene that will exemplify to the children the fundamentals of rural health and interpret to them the essential facts of wise and intelligent citizenship.

THE EYESIGHT OF SCHOOL CHILDREN*

By J. H. BERKOWITZ

One of the most valuable of the recent publications by the Bureau of Education is a study of the eyesight of school children, prepared by J. H. Berkowitz. The complete title of this publication: *The eyesight of School Children as related to school environment, and methods of prevention and correction* indicates its scope and general purpose. The bulletin represents the results of a comprehensive survey of the nature and extent of defective vision in school children, and of the preventable causes within the schools to which may be attributed eye strain and the general deterioration of visual capacity. It includes in addition to these data a discussion of prophylactic measures adopted in various school systems, both in this country and elsewhere, together with a summary of the most significant literature bearing upon the whole problem of lighting and other conditions affecting the vision of children both in and outside of the schoolroom.

Among the several related topics developed at some length by the author are: defective vision as related to retardation; the extent of defective vision among school children; environmental conditions unfavorable to eyesight; classroom lighting; educational hygiene and prophylaxis; graphic methods for educational hygiene; detection of defects; observation and recording; special classes for the semi-blind; correctional procedure; value of follow-up work; school clinics; the provision of eyeglasses; the cost of eyeglasses in various cities; compulsory treatment; needed standardization for schools; etc., etc.

The attached appendices contain much material of value and suggestiveness. Appendix I, for example, represents a part of the Report on Influence of Schoolbooks upon eyesight, made in 1913 by the British

*Published as Bulletin 65, 1919, of the United States Bureau of Education. Washington, D. C., Government Printing Office, 1920. 128 pp. Ill. Abstracted by the Editor.

Association for the Advancement of Science, and includes specimen type recommended for school books to be used by children of various ages. Appendix VII contains reproductions of the standard test cards and charts to be used by the examiner in testing the vision of literates and illiterates.

A bibliography of general references, carefully selected and annotated, completes the monograph. The JOURNAL heartily commends this bulletin to the attention of teachers, superintendents and school physicians. There is hardly a more important question before educational hygienists today than that which relates to the safeguarding and conserving of the eyesight of school children. According to the final report of the Provost Marshal General to the Secretary of War, one out of every ten drafted men who had to be rejected in the late war was rejected because of some serious eye deficiency. It would be futile to attempt to defend the opinion that all this defectiveness was traceable directly to schoolroom influences. The inference is almost unescapable, however, that those influences in a very great number of instances aggravated the condition of visual defectiveness and so, indirectly if not directly, contributed to increase the percentage of rejections on these grounds. We can not afford to neglect the investigation of a problem so fraught with possibilities of danger as that which centers about the conservation of the vision of school children.

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RECONSTRUCTION IN CHILD WELFARE

By ELIZABETH MCCracken

Children's Bureau, U. S. Department of Labor

Long before the outbreak of the war, more than one nation had recognized the fact that reconstruction in child welfare was needed, and had tried to bring it to pass within its own borders. And there have been signal examples, not only of municipal and state, but of national cooperation. For example, city agencies for the care of sick babies have cooperated with other city agencies for the care of pregnant women (in Boston, Mass., for example), appreciating the intimate relation between the health of the expectant mother and the health of her young infant. State organizations providing for the treatment of delinquent children have aided in efforts to secure mothers' pensions, realizing to how great an extent good behavior in children is contingent upon the presence of the mother in the home. And, even under the system of States' Rights, there have been in the United States significant instances of cooperation between the states, notably in the White Slave Act, which is essentially a measure for the protection of adolescent girls. Indeed, cooperation within the confines of a nation is gradually becoming a matter of course; even when there is no actual legislation providing for it, increasingly it occurs in the form of adoption by one community or state of methods or procedures demonstrated

as good in another. For instance, many a county has provided for a county public health nurse, owing to the excellent results obtained by such a nurse in some other county; the state board of health of one state is apt to study and either to follow or to adapt to its own need any feature of the program of another state board of health which has shown itself to be valuable.

But the war has taught the nations to go beyond their own confines. The note of the new era is not only cooperation and not only national cooperation, but international cooperation. This is, of course, only another term for internationalism. And there is no department of life in which internationalism can be so immediately and so permanently valuable as in child welfare. The attention of the world is peculiarly concentrated at the present time upon the interests of children. These interests, always paramount, never appear quite so immediate as at the end of a war—any war—and this has been a world war. It may perhaps be considered not only appropriate but almost inevitable that those nations which were allies in the war should now join together in formulating standards and making plans for the rearing of their children.

For, in order to be effectual, efforts toward reconstruction in child welfare must be based upon authoritative standards and be made according to a practicable plan; otherwise there is likely to be confusion and waste. By authoritative standards are understood those formulated by experts in the several fields of child welfare,—not by one expert for each field, moreover, but by a group for each field, in agreement as to what constitutes essentials in that particular field. A set of standards thus formulated, while not overweighted by the “specialty” of any one expert, yet contains the specialties of the several groups, in coordination. Similarly with plans. These, in order to be characterized by what has been termed “feasibility of performance,” must be made, not by one person, however able, but by a group of persons equally but variously able. In short, reconstruction in child welfare requires cooperation of the very highest and most finished kind.

In addition to its current work, the Children's Bureau of the U. S. Department of Labor, during the fiscal year 1918-1919, carried on as its chief activity the work now familiarly known to practically every section of the country as the Children's Year Campaign. The work was done jointly with the Child Conservation Section of the Field Division of the Council of National Defense. At the close of Children's Year, on April 6,

1919, all but two states were participating in Children's Year, and one of these had dissolved its State Division of the Women's Committee while the other was carrying on a child welfare program formulated before the war. Alaska, Hawaii, Porto Rico, and the Philippine Islands joined with the states and did child welfare work of some kind. Many types of organizations and many types of individuals made up the personnel of the workers for Children's Year; not only recognized experts, but 11,000,000 women, an enormous number of men, and a considerable number of young girls and boys, directed by experts, took part in the work; in every sense Children's Year was national.

But the concluding activity of Children's Year was international. In May, 1919, under the auspices of the Children's Bureau, there was an International Conference on Standards. To that Conference, at the invitation of the Secretary of Labor, the following guests from abroad came:

Sir Arthur Newsholme, late principal medical officer of the Local Government Board, England.

Mrs. Eleanor Barton, of the Women's Cooperative Guild, Eng., an organization of the wives of British wage earners.

Mr. Roland C. Davison, director of the juvenile labor exchanges of England.

Sir Cyril Jackson, board of education, England.

Dr. Clothilde Mulon, war department, France, who has done special work in the supervision of industrial creches during the war.

Dr. René Sand, professor of social and industrial medicine at the University of Brussels, and adviser on medical inspection of the ministry of labor.

Miss E. Carter, principal of high school C., Brussels.

Mr. Isadore Maus, director of the division of child protection, ministry of justice, Belgium.

Dr. Radmila Milochhevitch Lazarevitch, from Serbia, a physician and leader in social service activities.

Dr. Fabio Frassetto, professor of anthropology at the University of Bologna, Italy.

The Conference consisted of an initial conference in Washington, D. C., and eight other regional conferences, held respectively in New York, Cleveland, Boston, Chicago, Denver, Minneapolis, San Francisco, and Seattle.

Standards for the health, education, and work of normal children and for the protection of children in need of special care,

with special reference to conditions in the United States, were formulated and adopted at the Washington conference. These standards were considered by certain of the regional conferences and by many specially qualified individuals and, in their last revision, are herewith given:

MINIMUM STANDARDS FOR PUBLIC PROTECTION OF THE HEALTH OF MOTHERS AND CHILDREN.

MATERNITY.

1. Maternity or prenatal centers, sufficient to provide for all cases not receiving prenatal supervision from private physicians. The work of such a center should include—

(a) Complete physical examination by physician as early in pregnancy as possible, including pelvic measurements, examination of heart, lungs, abdomen and urine, and the taking of blood pressure; internal examination before seventh month in primipara; examination of urine every four weeks during early months, at least every two weeks after sixth month, and more frequently if indicated; Wassermann test, whenever possible, especially when indicated by symptoms.

(b) Instruction in hygiene of maternity and supervision throughout pregnancy, through at least monthly visits to a maternity center until end of sixth month, and every two weeks thereafter. Literature to be given mother to acquaint her with the principles of infant hygiene.

(c) Employment of sufficient number of public health nurses to do home visiting and to give instructions to expectant mothers in hygiene of pregnancy and early infancy; to make visits and to care for patient in puerperium; and to see that every infant is referred to child health center.

(d) Confinement at home by a physician or a properly trained and qualified attendant, or in a hospital.

(e) Nursing service at home at the time of confinement and during the lying-in period, or hospital care.

(f) Daily visits for five days, and at least two other visits during second week by physician or nurse from maternity center.

(g) At least ten days' rest in bed after a normal delivery, with sufficient household service for four to six weeks to allow mother to recuperate.

(h) Examination by physician six weeks after delivery before discharging patient. Where these centers have not yet been established, or where their immediate establishment is impracticable, as many as possible of the provisions here enumerated should be carried out by the community nurse, under the direction of the health officer or local physician.

2. Clinics, such as dental clinics and venereal clinics, for needed treatment during pregnancy.

3. Maternity hospitals, or maternity wards in general hospitals, sufficient to provide care in all complicated cases and for all women wishing hospital care; free or part-payment obstetrical care to be provided in every necessitous case at home or in a hospital.

4. All midwives to be required by law to show adequate training, and to be licensed and supervised.

5. Adequate income to allow the mother to remain in the home through the nursing period.

6. Education of general public as to problems presented by maternal and infant mortality and their solution.

INFANTS AND PRESCHOOL CHILDREN.

1. Complete birth registration by adequate legislation requiring reporting within three days after birth.

2. Prevention of infantile blindness by making and enforcing adequate laws for treatment of eyes of every infant at birth and supervision of all positive cases.

3. Sufficient number of children's health centers to give health instruction under medical supervision for all infants and children not under care of private physician, and to give instruction in breast feeding and in care and feeding of children to mothers, at least once a month throughout first year, and at regular intervals throughout preschool age. This center to include a nutrition and dental clinic.

4. Children's health center to provide or to cooperate with sufficient number of public health nurses to make home visits to all infants and children of preschool age needing care—one public health nurse for average general population of 2,000.

Visits to the home are for the purpose of instructing the mother in

(a) Value of breast feeding.

(b) Technic of nursing.

(c) Technic of bath, sleep, clothing, ventilation and general care of the baby, with demonstrations.

- (d) Preparation and technic of artificial feeding.
- (e) Dietary essentials and selection of food for the infant and for older children.
- (f) Prevention of disease in children.
- 5. Dental clinics; eye, ear, nose and throat clinics; venereal and other clinics for the treatment of defects and disease.
- 6. Children's hospitals, or beds in general hospitals, or provision for medical and nursing care at home, sufficient to care for all sick infants and young children.
- 7. State licensing and supervision of all child-caring institutions or homes in which infants or young children are cared for.
- 8. General educational work in prevention of communicable disease and in hygiene and feeding of infants and young children.

SCHOOL CHILDREN.

1. Proper location, construction, hygiene, ventilation and sanitation of schoolhouse; adequate room space—no overcrowding.
2. Adequate playground and recreational facilities, physical training and supervised recreation.
3. Adequate space and equipment for school medical work and available laboratory service.
4. Full-time school nurse to give instruction in personal hygiene and diet, to make home visits to advise and instruct mothers in principles of hygiene, nutrition and selection of family diet, and to take children to clinics with permission of parents.
5. Part-time physician with one full-time nurse for not more than 2,000 children: if physician is not available, one school nurse for every 1,000 children or full-time physician with two full-time nurses for 4,000 children for—
 - (a) Complete standardized basic physical examinations once a year, with determination of weight and height at beginning and end of each school year; monthly weighing wherever possible.
 - (b) Continuous health record for each child to be kept on file with other records of the pupil. This should be a continuation of the pre-school health record which should accompany the child to school.
 - (c) Special examinations to be made of children referred by teacher or nurse.

- (d) Supervision to control communicable disease.
- (e) Recommendation of treatment for all remediable defects, diseases, deformities, and cases of malnutrition.
- (f) Follow-up work by nurse to see that physician's recommendations are carried out.
- 6. Available clinics for dentistry, nose, throat, eye, skin, and orthopedic work; and for free vaccination against small-pox.
- 7. Open-air classes with rest periods and supplementary feedings for pre-tuberculars and certain tuberculous children, and children with grave malnutrition. Special classes for children needing some form of special instruction due to physical or mental defect.
- 8. Nutrition classes for physically subnormal children, and the maintenance of midmorning lunch or hot noonday meal when necessary.
- 9. Examination by psychiatrist of all atypical or retarded children.
- 10. Education of school child in health habits, including hygiene and care of young children.
- 11. General educational work in health and hygiene, including education of parent and teacher, to secure full cooperation in health program.

ADOLESCENT CHILDREN.

- 1. Complete standardized basic physical examination by physician, including weight and height, at least once a year, and recommendation for necessary treatment to be given at children's health center, school, or other available agency.
- 2. Clinics for treatment of defect and disease.
- 3. Supervision and instruction to insure—
 - (a) Ample diet, with special attention to growth-producing foods.
 - (b) Sufficient sleep and rest and fresh air.
 - (c) Adequate and suitable clothing.
 - (d) Proper exercise for physical development.
 - (e) Knowledge of sex hygiene and reproduction.
- 4. Full time education compulsory to at least 16 years of age, adapted to meet the needs and interest of the adolescent mind, with vocational guidance and training.
- 5. Clean, ample recreational opportunities to meet social needs, with supervision of commercial amusements.
- 6. Legal protection from exploitation, vice, drug habits, etc.

MINIMUM STANDARDS FOR CHILDREN ENTERING EMPLOYMENT.

An age minimum of 16 for employment in any occupation, except that children between 14 and 16 may be employed in agriculture and domestic service during vacation periods until schools are continuous throughout the year.

An age minimum of 18 for employment in and about mines and quarries.

An age minimum of 21 for girls employed as messengers for telegraph and messenger companies.

An age limit of 21 for employment in the special delivery service of the United States Post Office Department.

Prohibition of the employment of minors in dangerous, unhealthy, or hazardous occupations, or at any work which will retard their proper physical or moral development. All children between 7 and 16 years of age shall be required to attend school for at least nine months each year. Children between 16 and 18 years of age who have completed the eighth grade but not the high school, and are legally and regularly employed shall be required to attend day continuation schools at least eight hours a week.

Children between 16 and 18 who have not completed the eighth grade or children who have completed the eighth grade and are not regularly employed shall attend full time school. Occupational training especially adapted to their needs shall be provided for those children who are unable because of mental subnormality to profit by ordinary school instruction.

Vacation schools placing special emphasis on healthful play and leisure time activities shall be provided for all children.

A child shall not be allowed to go to work until he has had a physical examination by a public-school physician or other medical officer especially appointed for that purpose by the agency charged with the enforcement of the law, and has been found to be of normal development for a child of his age and physically fit for the work at which he is to be employed.

There shall be annual physical examination of all working children who are under 18 years of age. No minor shall be employed more than 8 hours a day. The maximum working day for children between 16 and 18 years of age shall be shorter than the legal working day for adults. The hours spent at continuation schools by children under 18 years of age shall be counted as part of the working day.

Night work for minors shall be prohibited between 6 p. m. and 7 a. m.

Minors at work shall be paid at the rate of wages which for full time work shall yield not less than the minimum essential for the "necessary cost of proper living," as determined by a minimum wage commission or other similar official board. During a period of learning they may be rated as learners and paid accordingly. The length of the learning period should be fixed by such commission or other similar official board on educational principles only.

Placement and employment supervision.—There shall be a central agency which shall deal with all juvenile employment problems. Adequate provision shall be made for advising children when they leave school of the employment opportunities open to them, for assisting them in finding suitable work, and providing for them such supervision as may be needed during the first few years of their employment. All agencies working towards these ends shall be coordinated through the central agency.

ADMINISTRATION.

Provision shall be made for issuing employment certificates to all children entering employment who are under 18 years of age. An employment certificate shall not be issued to the child until the issuing officer has received, approved, and filed the following:

1. A birth certificate or, if unobtainable, other reliable documentary proof of the child's age.
2. Satisfactory evidence that the child has completed the eighth grade.
3. A certificate of physical fitness signed by a public school physician or other medical officer especially appointed for that purpose by the agency charged with the enforcement of the law. This certificate shall state that the minor has been thoroughly examined by the physician and that he is physically qualified for the employment contemplated.
4. Promise of employment.

The certificate shall be issued to the employer and shall be returned by the employer to the issuing officer when the child leaves his employment. The school last attended, the compulsory education department, and the continuation schools shall

be kept informed by the issuing officers of certificates issued or refused and of unemployed children for whom certificates have been issued.

Minors over 18 years of age shall be required to present evidence of age before being permitted to work in occupations in which the entrance age or hours are especially regulated. Record forms shall be standardized and the issuing of employment certificates shall be under State supervision. Reports shall be made to the factory inspection department of all certificates issued and refused. Full-time attendance officers adequately proportioned to the school population shall be provided in cities, towns, and counties to enforce the school attendance law.

The enforcement of school-attendance laws by city, town, or county school authorities shall be under State supervision.

Factory inspection and physical examination of employed minors.—Inspection for the enforcement of all child labor laws, including those regulating the employment of children in mines or quarries, shall be under one and the same department. The number of inspectors shall be sufficient to insure semi-annual inspection of all establishments in which children are employed and such special inspections and investigations as are necessary to insure the protection of the children.

Provision should be made for a staff of physicians adequate to examine annually all employed children under 18 years of age.

MINIMUM STANDARDS RELATING TO CHILDREN IN NEED OF SPECIAL CARE.

The conclusions of the White House Conference of 1909 on the Care of Dependent Children are reaffirmed in all essentials. They have been guides for communities and States in reshaping their plans for children in need of special care. They are commended for consideration to all communities whose standards do not as yet conform to them, so that they may be translated into practice in the various States.

The fundamental rights of childhood are normal home life, opportunities for education, recreation, vocational preparation for life, and moral, spiritual and physical development in harmony with American ideals and the educational and spiritual agencies by which these rights of the child are normally safeguarded.

Upon the State devolves the ultimate responsibility for children who are in need of special care by reason of unfortunate home conditions, physical or mental handicap, or delinquency. Particular legislation is required to insure for such children the nearest possible approach to normal development. Home life, which is, in the words of the conclusions of the White House conference, "the highest and finest product of civilization," cannot be provided except upon the basis of an adequate income for each family.

The policy of assistance to mothers who are competent to care for their own children is now well established. It is generally recognized that the amount provided should be sufficient to enable the mother to maintain her children suitably in her own home, without resorting to such outside employment as will necessitate leaving her children without proper care and oversight; but in many States the allowances are still entirely inadequate to secure this result under present living costs. The amount required can be determined only by careful and competent case study, which must be renewed from time to time to meet changing conditions.

A State board of charities or a similar supervisory body should be responsible for the regular inspection and licensing of every institution, agency, or association, incorporated or otherwise, which receives or cares for mothers with children or children who suffer from physical or mental handicaps, or who are delinquent, dependent or without suitable parental care, and should have authority to revoke such licenses for cause and to prescribe forms of registration and report. This State agency should maintain such supervision and visitation of children in institutions and children placed in family homes as will insure their proper care, training and protection. The incorporation of private organizations caring for children should be required, and should be subject to the approval of the State board of charities or similar body.

State supervision should be conceived and exercised in harmony with democratic ideals which invite and encourage the service of efficient, altruistic forces of society in the common welfare.

Removal of children from their homes.—Unless unusual conditions exist, the child's welfare is best promoted by keeping him in his own home. No child should be permanently removed from his home unless it is impossible so to reconstruct family conditions or build and supplement family resources as to make

the home safe for the child, or so to supervise the child as to make his continuance in the home safe for the community. In case of removal separation should not continue beyond the period of reconstruction.

The aim of all provision for children who must be removed from their own homes should be to secure for each child home life as nearly normal as possible, to safeguard his health, and to insure for him the fundamental rights of childhood. To a much larger degree than at present, family homes may be used to advantage in the care of such children.

Before a child is placed in other than a temporary foster home, adequate consideration should be given to his health, mentality, character, and family history and circumstances. Arrangements should be made for correcting remedial physical defects and disease.

Complete records of the child are necessary to a proper understanding of his heredity and personality and of his development and progress while under the care of the agency.

Particular consideration should be given to children who are difficult to place and who require provision adapted to their peculiar needs.

Careful and wise investigation of foster homes are prerequisite to the placing of children. Adequate standards should be required of the foster families as to character, intelligence, experience, training, ability, income, environment, sympathetic attitude, and their ability to give the child proper moral and spiritual training. A complete record should be kept of each foster home, giving the information on which approval was based. The records should show the agency's contacts with the family from time to time, indicating the care given the child intrusted to it. In this way special abilities in the families will be developed and conserved for children.

Supervision of children placed in foster homes should include adequate visits by properly qualified and well-trained visitors who should exercise watchfulness over the child's health, education, and moral and spiritual development. Periodic physical examinations should be made. Supervision of children in boarding homes should also involve the careful training of the foster parents in their task. Supervision should not be made a substitute for the responsibilities which properly rest with the foster family.

The transfer of the legal guardianship of a child should not be permitted save with the consent of a properly designated State department or a court of proper jurisdiction.

In all cases involving the legal adoption of children, the court should make a full inquiry into all the facts through its own visitor or through some other unbiased agency, before awarding the child's custody.

Children in institutions.—The stay of children in institutions for dependents should be as brief as possible. The condition of all children in such institutions should be carefully studied at frequent intervals, in order to determine whether they should be restored to their own homes, placed in foster homes, or transferred to institutions better suited to their needs. While they do remain in institutions, their condition should approximate as nearly as possible that of normal family life as to health, recreation, schooling and spiritual, æsthetic, civic and vocational training.

Care of children born out of wedlock.—The child born out of wedlock constitutes a very serious problem, and for this reason special safeguards should be provided.

Save for unusual reasons both parents should be held responsible for the child during its minority, and especially should the responsibility of the father be emphasized.

Care of the child by its mother is highly desirable, particularly during the nursing months.

No parent of a child born out of wedlock should be permitted to surrender the child outside its own family, save with the consent of a properly designated State department or a court of proper jurisdiction.

Each State should make suitable provision of a humane character for establishing paternity and guaranteeing to children born out of wedlock the rights naturally belonging to children born in wedlock.

The fathers of such children should be under the same financial responsibilities and the same legal liabilities toward their children as other fathers. The administration of the courts with reference to such cases should be so regulated as not only to protect the legal rights of the mother and child but also to avoid unnecessary publicity and humiliation.

The treatment of the unmarried mother and her child should include the best medical supervision and be so directed as to afford the widest opportunity for wholesome normal life.

Care of physically defective children.—Special care and educational opportunities for deaf, blind and crippled children should be provided in the public educational system, local or State.

Mental hygiene and care of mentally defective children.—The value of the first seven years of childhood from the point of health, education, and morals and formative habits can not be overestimated. Throughout childhood attention should be given to the mental hygiene of the child—the care of the instincts, the emotions, and general personality, and of environment conditions. Special attention should be given to the need for training teachers and social workers in mental hygiene principles.

Each State should assume the responsibility for thorough study of the school and general population for the purpose of securing data concerning the extent of feeble-mindedness and subnormality.

An adequate provision should be made for such mentally defective children as require institutional care. Special schools or classes with qualified teachers and adequate equipment should be provided by educational authorities for such defective children as may be properly cared for outside of institutions. The State should provide for the supervision and after-care of feeble-minded persons at large, in the community, especially those paroled from institutions. Custodial care in institutions for feeble-minded children should not be resorted to until after due consideration of the possibility of adjustment within the community.

Juvenile courts.—Every locality should have available a court organization providing for separate hearings of children's cases; a special method of detention for children entirely apart from adult offenders; adequate investigation for every case; provision for supervision or probation by trained officers, such officers in girl's cases to be women; and a system for recording and filing social as well as legal information.

In dealing with children the procedure should be under chancery jurisdiction, and juvenile records should not stand as criminal records against the children.

Whenever possible such administrative duties as child placing and relief should not be required of the juvenile court, but should be administered by agencies organized for that purpose.

Thorough case study should invariably be made. Provision for mental and physical examinations should be available.

The juvenile victims of sex offenses are without adequate protection against unnecessary publicity and further corruption in our courts. To safeguard them the jurisdiction of the juvenile court should be extended to deal with adult sex offenders against children, and all safeguards of that court be accorded to their victims; or if these cases are dealt with in other courts, the facts revealed in the juvenile court should be made available, and special precautions should be taken for the protection of the children, as here suggested.

(To be concluded in the June number.)

PUBLICATIONS RECEIVED

A TEXTBOOK OF GYMNASTICS, by K. A. Knudsen, chief Inspector of Gymnastics for Denmark. Translated into English by Miss Ruth Herbert, Assistant Organizer of Physical Training for Cornwall, and H. G. Junker, Principal of the Physical Training Institute, Silkeborg, Denmark. Revised to conform to the official syllabus of England by Frank N. Punchard, Master of Method in the College of Hygiene and Physical Training, Dunfermline, Scotland. London and Philadelphia, J. B. Lippincott Company, 1920. 346 pp. Ill.

Knudsen's "Textbook of Gymnastics" reflects the ideals of the famed Swedish gymnast, P. H. Ling. The Ling system emphasizes harmonious development of the body, i. e., the importance of both beauty and health. In aiming to make the body beautiful we are really necessarily aiming to make it healthy. The characteristics of beauty of physique—the well-poised head, arched chest, free carriage and easy, supple movements—are the very outward signs of health and strength, and from a physiological standpoint ensure that the most important functions of the body—respiration, circulation and digestion—are carried on as smoothly and thoroughly as possible.

It is a mistake, we are told, to think that physical training becomes more satisfactory and attractive according to the number of exercises used. Far too often the short time given in the school curriculum to physical training is largely wasted on exercises of little real value in the achievement of good physique and harmony. The first thing, therefore, required of the teacher is a knowledge of how to evaluate properly the exercises he uses. This entails a second requisite in the capable gymnast: namely, a full knowledge of the physical body, its structure and its functions. To a somewhat full discussion of these two cardinal virtues in a teacher of physical training the book is devoted. The 29 sections into which the text is divided comprise chapters dealing with the history and general aim of physical education; the "table"; progression in gymnastics; the teacher; general points on good teaching form; gymnasium and apparatus; etc. The major portion of the book

is devoted to a clear, well-illustrated exposition of the most valuable forms of physical training for the various parts of the body. Among these may be mentioned the following: order exercises for all ages; leg exercises; neck exercises; arm exercises; exercises of span, heaving, balance, marching, running, etc.; lateral, abdominal and dorsal exercises, etc., etc.

The scores of cuts and sketches throughout the book add inestimably to its practical value.

THE SEX FACTOR IN HUMAN LIFE, a Study Outline for College Men, by Thomas Walton Galloway, Ph. D., Formerly Professor of Zoölogy, Beloit College. Author of "Textbook of Zoölogy," "Use of Motives in Moral Education," "Biology of Sex," etc. New York, The American Social Hygiene Association, Inc., 1921. (Publication No. 320.) 142 pp.

This most excellent book is written primarily for groups of college men, although extremely valuable to any thoughtful men and women. The whole theory of the author is that there is a correlation between knowledge and conduct; that in the long run intelligence and not ignorance about the great and fundamental issues of life will advance human behavior and success; and that college men are really seeking to find sane and fruitful interpretations of the life ahead of them.

The question and answer method is used in order that a certain greater concreteness and brevity than could obtain in a purely descriptive statement may be imparted to the topic under consideration. The entire book has been prepared with a view to synthesize the best contributions and highest knowledge from the fields of biology, psychology, sociology, medicine and hygiene, and of moral and religious philosophy. It is not, however, technical in style but rather presented in a remarkably plain and straight-forward diction which lends dignity and strength to the appeal which it can hardly fail to make to young men who are earnestly seeking for light and truth in the realm of high principle and moral living.

ELEMENTARY HOME ECONOMICS, by Mary Lockwood Matthews, B. S., Professor of Home Economics and Head of the Department of Home Economics in Purdue University. Boston, Little, Brown and Company, 1921. 343 pp. Ill.

This volume is intended for use in classes beginning the study of foods and cookery and also of sewing and textiles. It has been arranged for use in the grades and presupposes little training in general science. Part I deals with the selection of clothing and garment-making, the garments being actually made from commercial patterns. The hygiene of clothing, attractive and suitable clothing, care and repair, and the clothing budget are phases of the instruction in garment-making. Part II deals with foods, their selection and preparation, and the planning of meals from the nutritive, æsthetic and economic standpoints. Through a series of "Home Problems" it is the expectation of the author that the home and school work will be helpfully correlated.

The book is intended for use in schools where one book is desired to cover the entire course in home economics, and is strictly an elementary treatment of the subject.

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RECONSTRUCTION IN CHILD WELFARE*

By ELIZABETH McCracken

Children's Bureau, U. S. Department of Labor

Rural social work.—Work for the children needing special care has been neglected in rural parts of the country. Social conditions in rural communities are often as acute as in urban communities. The principles of child care as enumerated above are applicable to rural needs. Agencies for rural service should be encouraged, and should be adapted to the peculiar needs of rural communities. The county is usually the best administrative unit.

Scientific information.—There is urgent need of a more adequate body of scientific literature dealing with principles and practice in the children's field of social work, and the meeting of this need is the responsibility resting on those so engaged. Careful interpretation and analysis of methods and results of care and the publishing of these findings must precede the correcting of many present evils in practice. Boards of directors, trustees, trustees and managers should particularly

*Continued from the March number.

consider participation in the preparation of such a body of facts and experience as being a vital part of the work of their staff members.

GENERAL MINIMUM STANDARDS

Economics and social standards.—At the general session of the Washington conference the economic and social aspects of child welfare standards were discussed. While detailed standards were not formulated in this wide field, it was recognized that an adequate wage for the father, wholesome and pleasant housing and living conditions, and the abolition of racial discrimination are fundamental to the realization of any child welfare program.

Recreation.—The desire for recreation and amusement is a normal expression of every child, which must be considered in any program for the physical and moral education of children. Parents and others charged with their care should be educated as to the importance of recreation. Public provision should be made for wholesome play and recreation, both indoor and outdoor, under trained leadership, and especially adapted to different age periods of the child.

Commercialized amusements should be safeguarded by official supervisors having a scientific knowledge of recreation.

Child welfare legislation.—The child welfare legislation of every State requires careful reconsideration as a whole at reasonable intervals in order that necessary supervision and coordination may be made and that new provisions may be incorporated in harmony with the best experience of the day. In States where children's laws have not had careful supervision as a whole within recent years, a child welfare committee or commission should be created for this purpose. Laws enacted for the several States should be in line with national ideals and uniform as far as desirable in view of diverse conditions in the several States.

Child welfare legislation should be framed by those who are thoroughly familiar with the conditions and needs of children and with administrative difficulties. It should be drafted by a competent lawyer, in such form as to accomplish the end desired by child welfare experts and at the same time be consistent with existing laws.

It should constantly be borne in mind that these standards are minimum and do not represent all that might well be done,

but merely what cannot safely be left undone.

It will be noted that the standards provide for the care of the child, not merely from the day of birth but from the beginning of the mother's pregnancy; and that they relate to all the needs of the child except his need for moral guidance. It is scarcely possible and, moreover, it is not necessary to formulate general standards in regard to this matter, though it is of great importance as, and in the minds of many persons of greater importance than, the various other needs of the child. It is not possible to formulate general standards, for the reason that moral guidance must needs be individual; and it is unnecessary because each and every religious organization has recognized standards for its members, which, diverse in many ways, are alike in adequacy. It is, of course, a characteristic of all types of moral and religious standards that they are at one and the same time minimum and maximum,—that is to say, while they embody only what ought to be done, that particular thing is "perfection". In relation to children, all such standards agree in the following points:

- (1) Competent religious training, according to the faith of the parents. This implies
 - (a) regular attendance at such services of worship as may be provided by the religious body with which the parents are connected,
 - (b) full use of the means of regular instruction furnished by the religious body.
- (2) Religious and moral training from the parents in the home.
- (3) The benefit of a good example on the part of the parents in matters of principle and conduct.

Having agreed upon standards for child welfare in all its phases, it is next needful to make careful plans by which they may be attained. Such plans differ according to the thing to be accomplished; but they should be alike in being practical and coordinative.

In order to put into effect the minimum standards for the protection of the health of mothers and children, perhaps no one thing is so much needed as Federal aid—particularly in rural districts—and no one person so essential as the public health nurse. The series of studies made by the Children's

Bureau of maternity and infant care in both urban and rural areas show that poverty and ignorance are the main reasons for the high infant and maternal mortality rates in the United States. More than 16,000 mothers die yearly in or by reason of childbirth; at least half these deaths are preventable. More than 200,000 infants under one year of age die yearly; practically all these deaths are preventable. The poverty, which is one of the two contributing factors, could be mainly overcome by Federal aid; very many fathers who can meet the ordinary expenses of the family have no margin of money with which to meet the extra expenses of maternity care or the care of sick children. A plan by which this additional money may be provided was proposed in the Sixth Annual Report of the Children's Bureau for the fiscal year ending June 30th, 1918. According to this plan, the United States Government would cooperate with the several states in providing a joint fund in each state to be used to provide adequately effective means for the protection of maternity and infancy. Such public provision, it need not to be said, should be universal; in short, it should be plain to every mother that the bearing and rearing of children is a service to the State, and that, therefore, without loss of personal independence and without hurt to her husband's self-respect, she may accept such aid as she needs from the state and the nation.

However, to eliminate the factor of poverty is not sufficient; ignorance must be overcome. Just as "poverty" is comparative, and in an overwhelming number of cases means simply that extra expense cannot be met, just so ignorance also occurs in varying degrees. The lack of knowledge on the part of otherwise educated persons in regard to maternity and infant care is striking. A physician recently said to the father and mother of a first child—both of them university graduates and from homes in which higher education had been axiomatic for three generations—"I have never seen more densely ignorant parents!" Maternity is exactly the same condition, and the chances of a mother's life and death are precisely identical, whether she can read one, two, or three, or no languages. And the needs of babies are alike; if those needs are not known they are not met, and the results are the same, whether the parents live in a large house or in one room.

There are several means by which this ignorance can be overcome; but the very best means is the nurse, and in most

cases the public-health nurse. Some part of prenatal care and infant care, as well as care or supervision at confinement and post-natal care, must necessarily be given by physicians; but the needful instruction and a very large amount of additional care it is the office of the nurse to give. Some few mothers can have a private nurse; but these are very few indeed, partly because the expense is great and partly because the number of nurses is insufficient. Since a mother, neither during pregnancy nor the post-partum period, requires more than two or three hours' actual nursing care a day, to which needs to be added not more than three quarters of an hour for the care of the infant, it fortunately as well as naturally follows that one nurse, if she be a visiting nurse, can take care of at least six mothers and their babies.

In England, the work of the visiting nurse is supplemented by that of visiting household helpers. These "home helps", as they are called, come in to see that the older children, if there be any, go promptly to school; they do the necessary housework and cooking, if there be no one in the family to attend to this while the mother is incapacitated; and they otherwise give, not nursing care, but housekeeping assistance. Such helpers would be of great service in carrying out the program in the United States.

The minimum standards for children entering employment, it will be seen, require for their accomplishment a plan which included two elements: (1) enlightened public opinion and (2) adequate and thoroughly enforced laws. It has again and again been said that the best child labor law is a compulsory education law; and the standards suggest what should be a minimum provision and enforcement in this particular. In order to secure enlightened public opinion, not only the parents of children who seek employment but employers, also, require education. It may be that the great lesson of the war—that child life must not be wasted—contains within it the means to this education of the public. No figures are available as to the mortality or morbidity rates among working children, but the minimum health, educational, and, indeed, moral standards for children preclude child labor. Normal development, physical, mental, and moral, necessitates outdoor life, school attendance, and play, and a working child can have none of these.

The Federal Child Labor Act of 1916, which went into ef-

fect in September, 1917, was declared unconstitutional by the Supreme Court in June, 1918. In July, 1918, through the War Labor Policies Board, upon which were represented all the largest purchasing departments of the Government, it was voted that the standards of the former Federal Child Labor Law should be made a condition of all Government contracts. When the armistice was declared and Government contracts cancelled, it was necessary to make some other Federal provision for the protection of working children. In April, 1919, the provision of the Revenue Act of 1918, providing for a tax upon the products in the making of which children have been employed, became operative.

A study of the child labor laws of the several states shows great variety. Yet the needs of children and the requirements for their rearing do not differ in states or in nations. It would seem that, in the United States, Federal enactment should provide uniformity in this very important matter; and that public opinion should be definitely educated to that particular end.

Even in the average community, the child in need of special care, by reason of defectiveness, dependency, or delinquency, will be found. Such a statement as this is not uncommonly received with surprise,—the reason being that too many persons regard their particular community as the street in which they live, and that very often even that street is known to them only as regards a very few congenial neighbors.

Who has not heard a careful mother say to her child, "You must not play with 'that' child; he is a bad boy; and then forget all about that 'child'?" The 'bad boy', if not helped, is very likely to come to the attention of the truant officer or the juvenile court. In the beginning he may be, and usually is, not delinquent at all but only in danger of becoming so; indeed, he needs "special care" a considerable time before the probation officer or the institution gives it to him. Real community spirit, genuine cooperation between the fathers and mothers of a neighborhood, is one of the best protections against delinquency in children and should be, as it were, an introduction to minimum standards for the treatment of juvenile delinquency.

In order to put into effect the standards relating to dependent children, the working plan must never lose sight of the necessity for the parental element. When dependent children

cannot possibly be left in their own homes, they should be so placed that the new home actually is a home, and that the child receives not only scientific care but loving and interested care. Many parents have room not only in their homes but in their affections for another child; and many childless men and women have the parental feeling. Such persons, provided that they and their homes are otherwise fit, should be chosen in preference to others to care for children who must be taken from their own homes.

Children requiring very special care are those born out of wedlock. Within recent years, efforts to remove the handicaps which such children are made to suffer have been greatly augmented and strengthened. It is now an accepted fact among thoughtful persons that children born out of wedlock should be cared for in every particular as are children born in lawful marriage. In order to bring this about, there must be, first of all, fuller education of the community in regard to what constitutes essential justice. It is an interesting fact that during the early centuries of the Christian religion a child born out of wedlock, upon being received into the Church, was thenceforth regarded, not only by the Church but the entire community, as equal with other children,—on the basis that God was his father and the Church his mother, in common with all other children so received. Moreover, the mother of such a child, giving evidences “of contrition and a hearty desire of amendment”, was “absolved” and thereafter regarded by her neighbors, as well as the Church, as no longer a “sinner”. The manner of treating the child born out of wedlock and his mother, lost or obscured during successive centuries, is now being sought, in spirit if not in form, by all socially minded persons. The results may be found in enactments and in proposed legislation for the care of children born out of wedlock, as well as in the attitude more and more often taken toward them and toward their parents,—namely, a constructive attitude.

Another group of children provision for whose care requires well-informed public opinion, adequate legislation, and gentle care are defective children, whether physically or mentally defective. Adequate facilities and persons not only highly trained but with genuine interest in making the very best of these facilities are necessary. Only through such a plan can the full degree of development possible to these children, who

at best can develop only very partially, be secured. It is also of great importance that no confusion should exist in the minds of persons having to do with such children as to the fact that physical defect, even blindness, deafness and its occasional accompaniment, dumbness, is not and does not lead to mental defect. Physically handicapped children should not be further handicapped by the holding or the disseminating of this totally erroneous idea.

Plans for the utilization of standards for the moral welfare of children are provided by the several religious organizations; and highly trained persons whose first purpose in life is this particular work are in readiness to carry out these plans. What is acutely needed is the cooperation of parents. This will be secured in proportion as parents appreciate the fact that only through the full use of all the means to moral and spiritual education provided by the religious organizations of their respective faiths can their children receive the care they need in this matter. Moreover, it goes without saying that the parents must naturally believe and try to do what they are teaching and having their children taught to believe and try to do.

It has been said that the United States, since it was not broken by the world war, is not in need of reconstruction in the ordinary sense of the word. But can anyone doubt that, particularly in relation to child welfare, the United States needs reconstruction now,—and needed it for many years before the war? What the war has done in this respect has been to increase the vision of at least some portion of the American people and to concentrate their attention upon providing adequately for the welfare of children. Furthermore, there is a new sense of the immediacy as well as the importance of the problem: children are children for so short a time—and that time is so fraught with fleeting potentialities. What is to be done must not only be done well but done quickly. Authoritative standards, a coordinated plan, and the full use of the present moment are the essentials of child welfare and the minimum in a reconstruction program.

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AN IMPORTANT FACTOR IN OCULAR HYGIENE: GLARE

BY LAWRENCE AUGUSTUS AVERILL,

Editor of The American Journal of School Hygiene.

To the layman the most striking evidence of the importance of glare as a factor in human vision is doubtless the alarming number of automobile accidents in which glaring headlights have been responsible for dazzling the eyes of the operative so that he was totally at a loss to distinguish objects in the path of his own machine. So widespread indeed has this evil become that practically every state in the union has taken positive steps to reduce the dangers from glaring headlights to a minimum. Whether, however, these dangers can be wholly eliminated by specially ribbed and focused lenses is extremely doubtful. Until the time comes when our highways are lighted from overhead units there will doubtless continue to be numerous accidents at night time.

There are, however, other aspects of glare of extreme importance both physiologically and hygienically, and these are of vital concern to everyone. Old and young alike, whether out-of-doors or in-doors, in the daytime or at night, are subjected to more or less glare. This paper will enumerate certain of the evils resulting from such exposure of the very sensitive ocular mechanism to light of too great intensity, and

suggest certain hygienic precautions which all of us should take if we are to maintain the efficiency of vision at a reasonably high point.

How indefatigably active the pupillary muscles of an individual must be in the course of the day in order to protect properly the sensitive areas of the human eye we perhaps do not appreciate. Obviously there are large differences in the amount of light present during any one day as well as between very bright and very dark days, and the speed with which the eyes are able to adapt themselves to these sudden changes in the amount of illumination is truly astonishing. Cohn (2), for example, found in his photometric measurements on a single summer day the number of meter candles varying from 4, 519 to 76, 560, while on a single winter day he noted the enormous variation of from 579 meter candles to 9, 863.

Gstettner (5) reports observing in the lapse of a few seconds differences up to 250 meter candles on a desk in the middle of a schoolroom at noon. All this simply means that the human eyes, which are continually at the mercy of such sharp variations in luminosity must be protected by means of the pupillary mechanism against the entry of too much light. Let but so common an occurrence as a tiny cloud pass across the face of the sun, and the pupillary sphincters relax slightly to allow a greater amount of light to enter. Let now the sun suddenly break out through the cloud, and forthwith the reverse pupillary action must take place in order that too much light may be prevented from impinging upon the sensitive retina. In passing from a dark into a lighted room one experiences this phenomenon at its maximum. The quantity of light passing through the pupils is regulated almost instantaneously by the iris which initiates the contracting of the pupil in the bright light into which the eye is suddenly come. This, however, is a temporary reaction, for with the progress of adaptation in the retina the pupil again dilates. For some seconds after exposure to the brightness one is uncomfortably aware of the glare from it, the explanation of course being that the eye which the moment before was "dark adapted" is only slowly becoming "light adapted."

Kerr (8) ascribes to glare the chief importance among all ocular conditions, and considers it the chief ocular evil in the life of the school pupil. He points out that in order that the contrasts in the image may be sharp and clear, there must be

rapid removal of the products of metabolism, and unless this is done after-images may result. Improperly focussed light falling on the retina as a haze may also mar the necessary contrasts. Malnutrition or interference with the retinal circulation causes after-images from the sluggish removal of the waste products in the retina. This glare from the persistence of after-images is one of the earliest signs of migraine. In toxic or exhausted conditions, *muscae volitantes*, the shadows of little cells and obscurities in the vitreous which are usually unnoticed, set up after-images which may become positively disagreeable. Another very common condition in which excessive glare is set up may be experienced when the rays of bright or even dull light are reflected upon the upper instead of the lower halves of the retina. In our upright position the upper halves of the retina are lighted habitually by the relatively dark images of the foreground, while the lower halves are accustomed to the brighter reflections from the sky. "The myriad sparkle of the summer sea, sunshine on the dusty road, or snow upon the mountains may thus become intolerable. The wanderer notices no glare until he lies down on his back, but even a gray sky may set up glare when its image falls on other than the usual lower half of the retina."

The same author states that the effect produced on the retina by every image should be a transient one, except that in cases of considerable brightness intrinsic in the sources of light, the image is likely to be of some duration. In rare cases of highly intense visual stimuli there may occur permanent organic changes, as, for example, sometimes happens in the case of amateur observers watching the sunspots or eclipses without taking proper pains to protect their eyes from the brightness of the luminous surface. These functional disturbances may last for hours, or even days, and occasionally result in scotoma. Still another common cause of glare is unfocussed light arising from shiny surfaces and reflecting images into the eye.

Ferree (3), after citing the fact that the problem of the earlier lighting engineers was to get the maximum output of light for a given expenditure of energy, rather than to discover the relationship of lighting systems to the economy of the eye, asserts that the real test of a lighting system should be how little loss of efficiency the eye suffers over a considerable period of unbroken work, plus the maximum of comfort. In order to investigate this factor in various lighting systems,

Ferree, working with the American Medical Association, (1911), set about originating tests that would show reasonable constancy of visual efficiency under a favorable lighting system—or, in other words, to determine what lighting systems are best for the efficiency and comfort of the eye. While we are not concerned here with the tests actually evolved by Ferree, his findings are important. He mentions the following three aspects of lighting that sustain an important relation to eye-comfort and efficiency: (1) the distribution of surface brightness in the field of vision; (2) intensity; and (3) quality of the illumination. In the first of these, distribution, he finds proper illumination of a room by daylight to be the most satisfactory conditions from all points of view. Of the three systems of artificial lighting, the indirect illumination is best, being more approximately like daylight than any other. The loss of efficiency during a three-hour period of work was only slightly greater under this system for all observers than for a similar period by daylight for the same foot candles of illumination. The greatest loss of efficiency in the observers was suffered under the direct system of illumination, while the loss incurred under the semi-indirect was nearly as great. In general, there is slight difference in efficiency and eye comfort under the daylight and indirect methods, while both methods are far superior to the direct and the semi-indirect.

In the second aspect of lighting, intensity, Ferree finds that while a very wide range of intensity is permissible for daylight and the indirect type of system, for the semi-indirect system, the eye falls off heavily in efficiency for all intensities outside a narrow range on either side of 1.7 foot-candles, measured at the level of the eye at the point of work, with the receiving surface of the photometer in the horizontal plane. For the direct system, however, no intensity can be found for which the eye does not lose a very great deal in efficiency as the result of work. Compared with Ferree's findings, the intensity recommended by the Illuminating Engineering Society (Primer, 1912) for semi-indirect lighting ranges from 2-3 to 7-10 foot-candles, with 5-foot candles taken as the median of value. This is approximately three times the intensity of illumination recommended by Ferree. The explanation offered by Ferree is, and probably truly, that for a short period of work an intensity of 1.7 foot-candles does not give the maximum of vision. At an intensity, however, which

does give maximum acuity for the momentary judgment, the eye runs down rapidly in efficiency over a considerable period of close application. The eye breaks down less rapidly under sustained effort when the intensity of the illumination is much lower than the standard recommended by the Society.

In the third aspect, quality, this author finds that, while more experimentation is needed, the work that has been done shows that clear white light affords a greater acuity of seeing than do lights of any of the colors projected through tinted globes.

Ferree's general conclusion is that if the light is well distributed in the field of vision, and if there are no extremes of surface brightness, the eye is practically independent of intensity—of course within reasonable limits. But for the kind of distribution effects we are getting from the large majority of our lighting systems, unquestionably too much light is being used for the welfare and comfort of the eye. If the source of light is to be in the field of vision at all, it should be as nearly as possible at the level of the eye, in order that the irritating effects commonly produced by the source of light falling on the upper or lower halves of the retina may be removed.

Luckiesh (9) points out, however, that the removal of the light sources from the field of vision is only half what must be done in order to safeguard the pupils' eyes from discomfort and injury. It is of equal importance that the surface polish of walls, blackboards desk-tops and paper be eliminated. Undoubtedly, the chief among these offenders is the glossy paper, so frequently still made use of by text-book makers, which acts as a mirror to reflect brightness from the lighting units directly or obliquely across the field of vision. At the Dundee meeting of the British Association for the Advancement of Science, in 1912, a paper for school books was recommended that should be absolutely without gloss. A white paper, or one slightly toned towards cream color, was proposed as the most satisfactory shade. Luckiesh mentions the fact that from glazed paper there is always an imperfect image of the lighting unit superimposed constantly upon the bright background, which is very disagreeable to the eyes. Beside this image of the units, the brightness of the paper itself, due to the diffusely reflected light, varies inversely as the square of the distance of the paper from the light source. Thus, while the amount of annoyance produced by paper held close to the light source

is slight, it becomes tantalizing when the source and the paper are considerably removed from one another—a condition which necessarily obtains more or less in the schoolroom. Obviously, what makes it possible for words to be perceived sharply on paper is the degree of contrast between the black of the print and the white background; and any factor which tends to disturb this contrast is objectionable. "Assume that the ratio of brightness of the black characters—due to diffusely reflected light—to that of the white background is 4 to 100. This might be called the contrast ratio due to diffusely reflected light. If the paper and ink are somewhat glossy, they will also reflect light directly as a mirror does. Assume that each directly reflects the image of the light source with a degree of brightness that results in a contrast ratio, due to reflection alone, of 200 in the units of brightness as the first ratio. These brightnesses, due to regular and diffuse reflection, are, of course, superimposed with the resultant contrast ratio of $4+200$ to $100+200$, or 204 to 300 ." Here the contrast ratio has been reduced from 1 to 25 to approximately 2 to 3. Of course, as Luckiesh points out, it is conceivable that, due to the pressure of the type during printing, the contrast ratio may be actually reversed and the black characters become actually brighter than the paper. But the eye, being focussed for the printed matter, is bothered by the reflected image of the light source which spreads itself out over the retina, thus forming a veil which reduces the contrast. Under such conditions, the contrast may actually be reduced to zero. One can easily establish this principle to his own satisfaction by attempting to read in a sun-lit window from a book in which a highly polished or coated finish is used. It will be found that only after the book has been turned so that the page lies in a plane which is perpendicular to the line of vision can the words be read, and then with considerable strain and discomfort.

The same author refers to a committee appointed by the Illuminating Engineering Society for the purpose of studying glare from reflected surfaces. This committee is quoted as already having conferred with several publishers of school books and with many school officials in large cities—but with rather unsatisfactory results. But few of the school officials have reported, while the publishers, admitting the undesirableness of glazed papers, usually claim it is impossible to obtain an unglazed paper which will reproduce half-tones satisfactorily

and still fulfill the requisites of cheapness and durability. More recently, however, with the growth of more refined printing processes, it has seemed that very excellent half-tone results may be had on paper that is entirely unglazed. What is needed, however, is a concerted demand on the part of all school authorities for such paper. With a few conspicuous exceptions, there has been little effort made to impress publishers with the importance of this matter, although there are at the present time in this country several large and well-known educational publishing houses which have appreciated the importance of this matter and have led the way in printing text books for schools on unglazed paper.

A. v Reuss (10) is in substantial agreement with Ferree in the evils of too strong light. In the case of protracted work under such conditions, he finds, hyperaesthesia of the retina may frequently follow. Snow-blindness, so-called, in consequence of looking for some time upon the dazzling snow, is an illustration with which persons in temperate zones are well familiar. Mountaineers and arctic explorers are especially liable to ocular injury, the excessive amount of ultra-violet rays burning the conjunctiva and in extreme cases the cornea. Posey (11) recommends for protection against snow and ice glare the common open spectacle frame fitted with large smoked or tinted glasses, and reports that all more or less hermetically fitting goggles for the exclusion of side light have been found by travelers to be superfluous and serve only to moisten the glasses. Motorists who have worn such goggles can bear witness to the truth of the latter statement. Glasses tinted yellow-green, according to this investigator, absorb the ultra-violets rays, and at the same time have but little coloring effect upon the landscape seen through them. There are also some cases on record of amateur sun-observers who, failing to equip themselves with proper lenses, have suffered either temporary or permanent blind areas in the retina which the glare from the sun has inflicted. In one such case, Dr. Paul Roemer, chief of the Greifswald University Eye Clinic, was actually able to see by means of the ophthalmoscope a persistent destruction in the region of macula lutea. Still other illustrations of injury to the ocular mechanisms by work in too strong light may be seen in eye-twitchings, epiphora, hyperaemia of conjunctiva and in the lid margins.

Alger (1) supports Ferree in charging that people very often

insist on needlessly bright illumination of their homes and workrooms simply because they have accustomed themselves to it and have in consequence so blunted their retinal sensitivity that a reasonably bright light appears altogether inadequate for them. Both Alger and other investigators, however, hasten to point out that light that is actually too dim is just as harmful to eyes which must see in it as is light which is too strong.

In artificial lighting, sharp contrasts between either lighting units and their backgrounds or light and dark objectives should be reduced to the minimum. A gas-mantle, as Ives (7) points out, may be viewed against the bright sky in the daytime with no discomfort whatever, whereas the same mantle, seen against the darkness of night time may be all but unendurable. In this connection the effects of the motion-picture are specially deserving of note. Unquestionably the least strain is imposed upon the eye mechanism by attendance at the moving picture theatre in the evening. At such a time the sharp contrast between the bright out-of-doors and the dim theatre is absent, and the adjustment which the eyes are compelled to make upon entering the theatre is obviously much less in amount. In passing from the natural light of the street, however, into the semi-darkness of the theatre during the daylight hours, one is immediately aware of the extraordinary strain placed upon the eyes.

In order, therefore, to reduce to a minimum the amount of adjustment required of the eye muscles, it is important that the theatre, instead of being in almost complete darkness, save at the screen, be as light as possible without lessening too appreciably the sharpness of the shadows upon the screen. In the event of the room being too light, the eyes will be forced to use more energy in fixating the images on the screen before them. The indirect system of lighting is to be recommended for the general illumination of the house as interfering least with the satisfactory perception of the pictures. Considering the millions of pairs of eyes that are daily riveted upon the screen for a period of from two to four hours, it is particularly important that theatre managers should be compelled by law everywhere to maintain their equipment in the best possible condition in order that the eye mechanisms may suffer the minimum of fatigue in the ocular ordeal of the screen.

Ives (7) notes that good artificial lighting is not a question

of the kind of illuminant, but rather of how the illuminant is used, the whole problem of artificial lighting being, according to him, but a matter of the proper disposition of the light with respect first, to the objects to be lighted and, second, with respect to the people who are to see these objects. The most fundamental principle of good artificial lighting is that the light must shine on the object and not in the eyes of the observer. An unshielded light should then, according to this cardinal hygienic principle, never be visible. It must, however, be shielded in such a way that the maximum of its brightness shall fall upon the object of interest, whether that object be the printed page, or the sewing, or the lathe. Lamp-shades on electric reading lamps are often particularly disagreeable and fatiguing to the eyes because of the wavering shadows cast by ornamental fringes and tassels depending from the lower rim of the shade. Reading over a polished table top which throws back the glare of the lighting unit into the eyes is also a practice to be condemned, as is likewise that of reading with the lamp directly before one.

The same writer makes an excellent distinction between directed and diffused lighting, the former being thrown sharply and directly upon some local objective such as a type-setting case, sewing, etc., leaving the remainder of the room in sharply defined shadow; the latter being distributed evenly and softly over a non-localized area with attending absence of contrasting illuminated and shadowed spots. Diffusion is ordinarily obtained either through frosted or opal bulbs or globes or through redirection of the light rays upon a white surface, such as the wall or ceiling, which then becomes the light source.

CONCLUSIONS.

The following conclusions and recommendations concerning glare are important:

1. The phenomenon of glare is of extreme importance, both physiologically and hygienically and deserves to be better understood as of vital concern to the efficiency of the human eye.

2. A tremendous amount of muscular adjustment and readjustment is demanded of the eyes in order that ordinary changes in the brightness of illumination about one may not injure the sensitive areas of the retina.

3. Persistence of after-images, due to such physiological maladjustments as slow removal of metabolic products, malnu-

trition, interference with retinal circulation, etc., is a common cause of glare.

4. Visual stimuli of a high degree of intensity may be instrumental in permanently injuring or even blinding the eye not properly protected.

5. Unfocussed light is a common cause of glare; particularly is this true in schoolrooms.

6. The indirect method of illumination most closely approximates natural illumination in quality, and so is least apt to cause glare.

7. There is grave danger in many of our lighting systems that too much light is used for the best economy of vision.

8. All light sources should be removed from the field of vision or else properly shaded.

9. Surface polish of walls, blackboards, desk-tops, paper, etc., should be eliminated from every schoolroom.

10. In all forms of artificial lighting sharp contrasts between both lighting units and their backgrounds and between light and dark objectives should be so far as possible ruled out.

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ZINC IONISATION IN THE TREATMENT OF CHRONIC OTORRHOEA IN SCHOOL CHILDREN

By A. R. FRIEL, M. D., F.R.C.S.I.*

In acute suppuration of the middle ear the discharge shows an infection by a single species of micro-organism such as pneumococcus. If care is taken to absorb the discharge the tissues develop sufficient power in a few days to repel the micro-organism and the patient recovers. If, however, the discharge is allowed to lie in the meatus it frequently becomes infected by micro-organisms from the skin or air. This decomposing discharge—not necessarily foetid—irritates the tissues with which it is in contact, which in their turn respond by throwing out more leucocytes and more fluid. It is this infection of the discharge which causes acute otorrhœa to become chronic. The task is then to sterilise an albuminous fluid outside, but in contact with living tissues without irritating the latter.

Experience shows that if the accumulated discharge is regularly removed by mechanical means and measures adopted to keep the ear dry we often succeed in bringing about a cessation of this discharge. To carry out this method of treatment effectively in the large number of cases of otorrhœa occurring among school children is found an impossibility. Any other method of treatment, therefore, to sterilise readily the infected area without causing irritation and which can be easily applied is worth study.

Zinc ionisation consists in introducing into exudations or tissues particles of zinc by means of the electric current. The particles are the electrically-charged atoms known as "ions," because under the influence of the electric current they can be

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made to travel in a definite direction, permeating and penetrating the exudation, or tissues, with which they are in contact. Zinc ions have the property of coagulating albumen, and as bacteria (as well as blood and tissue-cells) are composed largely of albumen, these are coagulated and killed. The exudation is rendered sterile and the irritation of the tissues and otorrhœa ceases. In cases suitable for this procedure sterilisation occurs with one application, so that often within twenty-four hours an ear which has been discharging for weeks, months or years is free from discharge or inflammation.

Sepsis is the basic factor. When it is confined to the tympanum and is the *sole* factor ionisation alone is sufficient treatment. If small granulations are present, or if there is much swelling of the mucous membrane, or inflammation of the external auditory meatus, boracic powder should be blown into the meatus immediately after ionisation to absorb any fluid which exudes before the granulations have disappeared, or all swelling and inflammation have subsided.

After an ear has been carefully cleansed it is washed out with a weak solution of zinc sulphate. The child lies down on a couch and the positive electrode is inserted in the ear, the negative one being applied to the arm or leg over a towel wrung out of salt solution. A current of 2 or 3 milliamperes is used for ten minutes.

The records kept of each case show age, duration of discharge, cause of chronicity, treatment and result.

From an analysis of these records it appears that more than half of the cases of otorrhœa in school children can be *readily* cured by ionisation.

Of 49 cases which were cured at the London County Council's clinic for this treatment, 27 paid two visits to the clinic and 11 three, while 11 paid more than three visits.

Of 38 cases ionised from one centre 26 were known to be cured, 3 did not return, 5 ceased to attend, 2 were referred for operation, and 2 were still under treatment.

As to permanency of result, zinc ionisation is an antiseptic procedure, not a method for producing immunity, which last results from disease or inoculation. Possibly the tissues in the ear have been inoculated to a considerable extent by the products of the germs which have been so long in contact with them. Experience shows that when a patient has recovered from otorrhœa by ionisation a recurrence is uncommon.

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THE HEALTH TOWN

Contributed by the
National Tuberculosis Association

In the fall of 1916 a fund of \$100,000 was made available for the National Tuberculosis Association by the Metropolitan Life Insurance Company of New York for the purpose of carrying on in a typical small American city a demonstration of what could be done and should be done by each community in the prevention and care of tuberculosis. The idea back of the demonstration was to put into practice every known method of attack on the Great White Plague.

Framingham, Mass., because it was an ordinary, average town with an average type of population, and an average death rate from tuberculosis and other causes, was chosen as the seat of the demonstration.

In every community there are certain forces which can be utilized to build up the community's health. The first great force is of course, each citizen of the community. Every individual each day is doing something either to build up or tear down his health and the community health. The first step therefore, was to interest every one of these potential health builders in the movement. That they became interested is shown by the fact that over 12,000 out of a population of 17,000 in Framingham presented themselves voluntarily for complete physical examinations or were examined in the schools and

factories so that a true picture of the town's health was secured. Doctors, medical societies, the board of health, the nurses in hospitals and the visiting nurses, and welfare organizations then put their shoulders to the wheel to help rid the town of tuberculosis.

Much has already been accomplished although the demonstration is not yet complete. It has cost money to be sure, but in a summing up the cost of the demonstration to date, it is shown that the total would be possible for any community that valued its health enough to pay for it. Every community pays for its streets and its schools and its fire department, because it values these essentials of a good town. But no town pays as much for its health as the benefits of health would warrant. What Framingham did, and is still doing, could be done year in and year out for an average expenditure of about two dollars a year per capita.

Why should not a town spend as much for the prevention of sickness as it does for the prevention of property loss by fire? Considering the importance of physical development as a source of joy and comfort and profit and power, it is hard to imagine why communities do not see the importance of spending at least an equal amount for these blessings as they do for fire prevention, public school education, etc.

If it did no more than reduce the annual death rate the \$35,000 spent in one year in Framingham would be worth the outlay. For example, the death rate last year among infants was 62 per thousand instead of 81 the year before. The death rate among the whole population dropped from 14 per thousand where it had been for the previous ten years, to 11 per thousand. In a town of 17,000 inhabitants this means a saving of 51 lives. It has been estimated that the loss from each person who dies before his time is \$10,000 in the case of tuberculosis. This means at the lowest estimate a prevention of several hundred thousand dollars of economic loss, besides the unnecessary grief and suffering. The tuberculosis death rate in Framingham was 121 per 100,000 population prior to 1917. In 1920 it was 64 per 100,000. There was a drop of 20% the first year and 30% the second year.

During the first three years of work over 250 cases of tuberculosis were brought under advice or treatment. Many of these were arrested by treatment and the patients are now at work. Realizing the importance of all associated forms of ill health, arrangements were made for correcting any and all

defects found. A school dental clinic was established. Children as well as adults having nose and throat trouble were earnestly advised to have these attended to. A summer camp for young children was established. School luncheons were arranged for in one of the schools. Modern Health Crusade Clubs were formed among the children. Factory health conditions were improved by providing expert health consultation service for workers, compulsory annual physical examination, improvements in the working conditions. Local milk conditions were investigated and improved. Domestic science and food economy were started, for it is an unfortunate fact that very few housewives have any conception of the tremendous importance of the right kind of food in the right quantities, properly cooked, not only for themselves but also for their husbands and children. Two infant welfare nurses were provided to help the mothers to carry the babies over that most dangerous age of all from the point of susceptibility to tuberculosis, up to three years of age.

The physicians themselves, stimulated by the increased interest of the public, held a post-graduate medical lecture course with experts in various lines to give the addresses. They also arranged for experts in tuberculosis to cooperate with them in early diagnosis and cure of tuberculosis.

In addition to all these measures, many educational pamphlets were issued to adults, especially mothers, on the various phases of disease prevention and it is safe to say that no town in the United States now knows more about its health than does Framingham, the Health Town.

The Framingham Health and Tuberculosis Demonstration shows what can be done with moderate expenditure and proper organization of community resources. It is for the purpose of promoting similar efforts on the part of other communities that the appeal is being made for funds by the National Tuberculosis Association through the sale of Tuberculosis Christmas Seals which will be conducted in December.

THE IMPORTANCE OF VITAMINES IN THE DIET

By LAWRENCE A. AVERILL,

Editor of The American Journal of School Hygiene.

It has until recently been supposed that provided one ate certain common foods in the proper amounts, health, in so far at least as diet is concerned, would take care of itself. Such common foods were assumed to be protein, carbohydrates and fats, with a seasoning of iron and calcium and phosphorus. Somewhat recently, however, the results of certain careful experiments upon animal nutrition have tended to upset our theories, at least partially, by suggesting the necessity of three additional food materials in the diet which previously had not been heard of by the laity and had only partially been understood by the scientist.

Experimenting in 1881 upon the diet of mice, Lunen discovered that while mice could live for an almost indefinite period upon a diet of milk they succumbed very quickly (i. e., within a month's time) when fed a diet of what is commonly believed to be the essential ingredients of milk: casein, fat, milk sugar and ash. From these experiments he concluded that there must be in milk certain indispensable elements besides those commonly known.

Following the pioneer work of Lunen, Hopkins, an English scientist, Osborn and Mendel, of Yale, and McCollum and Davis of Johns Hopkins, have succeeded in establishing the existence of three accessory food elements in certain substances, and to them the name *vitamines* has been given. Thus far, it is true, no one has succeeded in actually isolating any of these three elements, nor in analysing very actually their chemical or physical properties. Experiments in the diet of animals, however, have seemed to demonstrate beyond a doubt the presence of all three of them in certain food products. As to how great quantities of them are requisite to the diet of human beings, and how great quantities are contained in food stuffs, nobody yet knows. About the only positive information we

have, in addition to the knowledge that they exist, is that a complete lack of these elements in the diet may and does lead to actual disease, and that too great deficiency in them may be responsible for ill health and retarded growth in the young.

The names which the investigators have given to these three mysterious food elements are: (1) fat soluble A; (2) water soluble B; and (3) anti-scorbutic C. Following is a brief description of each of these three substances.

FAT SOLUBLE A.

This vitamine owes its name to the fact of its solubility in fat. It is found chiefly in solution in animal fats, butter, cream, egg yolk, beef fat, fish oils, etc., but does not occur to any appreciable extent in vegetable oils. In addition to these, Fat Soluble A is found commonly in two other sources: glandular organs (liver, kidneys, pancreas) and leaves of vegetables (asparagus, Brussels sprouts, cabbage, lettuce, celery). It is believed that Fat Soluble A is of prime importance in the promotion of normal growth in young people, and that it acts as a preventive against rickets, on the one hand, and xerophthalmia, (a vicious disease of the external coating of the eye) on the other.

The history of the diets prescribed for tuberculosis sufferers throws an interesting light upon the importance of Fat Soluble A. It has long been known that a generous dietary reacts favorably upon the tuberculous patient, and now comes the significant revelation that those very foodstuffs most universally regarded as essential in the feeding of consumptives are particularly rich in Fat Soluble A. Among such foods may be mentioned cream, milk, butter, eggs, cod liver oil, etc.

Dietitians are now recommending that at least one of the foods containing Fat Soluble A (and preferably two of them) should appear daily in the diet of growing children if they are to grow normally and maintain their health in prime condition. It is likewise essential that adults, in the interest of strength and resistance power, should see to it that such foods find a prominent and constant place in their menu. Of particular importance is it that pregnant and nursing mothers should have a liberal supply of Fat Soluble A in their diet. In this connection it is pointed out that bottle-fed babies are not the only ones who are subject to attack from rickets. Breast-fed infants may, if the mother's milk is deficient in Fat Soluble A,

fall easily prey to this disease, since obviously their only source of supply of this very essential element is the milk of the mother. Not only is the infant whose diet lacks the proper amount of the soluble incurring the risk of becoming rickety, but in addition it is suffering deprivation of a substance which seems to be indispensable to normal growth at a period when the growth impulse can ill brook any interference.

WATER SOLUBLE B.

As its name would indicate, the second of the three important vitamins may be dissolved in water, and is often referred to as Water Soluble B. With the exception of white flour, white rice, sugars, starches and fats, and possibly a few other foods, this soluble is found in some quantities in all natural food-stuffs. Hence there is little danger of any diet being deficient in it. The chief sources of Water Soluble B are the seeds of plants, eggs and highly cellular organs, such for example as liver. Flesh contains comparatively little. Yeast cells are a rich source of this element, hence the modern popularization of the eating of yeast as a cure-all. In the legumens (peas and beans) the soluble is distributed tolerably evenly throughout the seed, whereas in cereals it is concentrated in the germ and outer layer. Consequently the milling process removes the greater part of Water Soluble B, which remains in the bran. For this reason bran is believed to be a very beneficial adjunct to the dietary.

Since Water Soluble B is dissolvable in water, it tends to cook out of vegetables which are boiled, and if the water is thrown away this vitamin is obviously lost. Whenever possible, therefore, such water ought to be made use of in soups or gravies. Vegetables baked or steamed, rather than boiled, preserve the soluble intact so that its value as a vitamin is not lost. Water Soluble B appears an essential in the diet as a promoter of growth in the young and as a preventive against antineuritic conditions, also beri-beri.

ANTI-SCORBUTIC C.

The third vitamin has been named Anti-Scorbutic C, in recognition of its virtue as a preventive and cure for scurvy. Like Water Soluble B, it is soluble in water. Among the most

common sources from which we derive this vitamine are fresh vegetables and fruits. Foods that are richest in this element include lettuce, cabbage, turnips, tomatoes, raspberries, oranges and lemons. Potatoes, while relatively poor in content of Anti-Scorbutic C, probably are the chief preventive against scurvy in the northern countries where other vegetables are rare by reason of the fact that they comprise a very large part of the diet. Dried vegetables, it is interesting to note, are deficient in Anti-Scorbutic C, as are all canned vegetables and canned meats. Canned fruits and tomatoes, on the other hand, because of their acidity increase the stability of the vitamine and its destruction is consequently in a measure prevented, although it exists in less quantity than in the fresh fruit.

In environments where fresh vegetables or fruits are not available, Anti-Scorbutic C may be supplied in sufficient quantities for the dietary by means of moistening the available seeds, such as wheat, barley, rye, peas, beans and lentils, and allowing them to sprout. Sprouts on vegetables thus treated are relatively rich in content of Anti-Scorbutic C and may be cooked (the shorter time, the better) and served in the ordinary way.

All bottle-fed infants require an extra Anti-Scorbutic, since cow's milk, even when raw, is poor in this element, and when heated or Pasteurized or otherwise preserved the vitamine is still further reduced. The best anti-scorbutic food to use for this purpose is orange juice, although tomato juice and grape juice are excellent. In the case of breast-fed babies, it is important that the diet of the mother contain an adequate supply of fresh fruits and vegetables.

IMPORTANCE OF VITAMINES IN THE DIET.

It is now pretty generally admitted that failure to include these vitamins in large quantities in the diet not only may result in retarded growth and development and a lessened resistance to disease in childhood, but may actually be responsible for lowered resistance power in adults and even lead to such specific diseases as rickets, scurvy, xerophthalmia and beri-beri. The effect upon the nervous system of a dietary deficient in these important elements may be profound, and it has been demonstrated by scientists that a diet otherwise adequate will, if deficient in vitamins, lead in many cases to ab-

normal development of the bony tissue, particularly of the teeth. Absence of vitamins may be a cause of prolonged retention of the temporary teeth, delayed eruption of the permanent set, irregularity in alignment, defective enamel, decalcification, and even loosening of the teeth.

Important as are the vitamins in the adult dietary, they are even more so in the diet of the growing child, if development is to be regular and growth normal. It would be an extremely interesting thing if we could know approximately what percentage of the malnutrition, rickets and other disorders of growth and development in children of school age is traceable to deficiencies in vitamins. The indications are that the percentage would be a high one.

The recent research into the nature and value of the vitamins has served to complicate still further the already complex problems of health and disease. Taken together with modern discoveries of the action of the glands of internal secretion and their relationship to normal functioning of the organism, this newest discovery serves to emphasize anew the age-long problems connected with the efficiency of the human machine, and to suggest that after all many of the secrets of health and disease have not yet been ferreted out.

(Adapted from an article entitled "Vitamins or Accessory Food Factors", by Mrs. Alzira Wentworth Sandwall, of the Massachusetts State Department of Health, in *The Commonwealth*, Vol. 8, No. 3.—Ed.)

The American Journal of School Hygiene

LAWRENCE AUGUSTUS AVERILL, Editor
Worcester, Massachusetts

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